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PRINCIPLES OF SURGICAL PRACTICE

THERAPEUTIC CONSIDERATIONS IN ACUTE OBSTRUCTION OF THE SMALL INTESTINE

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ACUTE intestinal obstruction may be defined as the condition in which there is the more or less sudden cessation, partial or complete, of the normal forward motion of the intestinal content, from whatever cause, for a period long enough to produce local and general pathological changes. Acute obstruction is essentially, therefore, intestinal stasis of such degree that it causes pathological alterations not only in the obstructed bowel segment but elsewhere in the body as well. And it is from these alterations that the signs and symptoms occurring in acute obstruction arise. Whatever the specific causal agent responsible for production of the obstruction may be, it can only produce the degree of stasis of intestinal content sufficient to constitute obstruction in one, two, or all of three ways:

(1) By occlusion of the intestinal lumen so that an actual mechanical barrier is set up against the normal forward progress of the bowel content

(2) By reduction of intestinal peristalsis, in which case the normal propulsive power of the intestine is decreased to a point inadequate for further motion of the substance contained in the lumen

(3) By embarrassment of the circulation to the intestine to such a degree that the peristalsis becomes inadequate and the intestinal lumen insufficient for passage of its content

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Occlusion of the intestinal lumen of whatever degree may be caused by agents within the lumen itself, within its walls, or from without (35); occlusion is consequently intraluminal, intramural, or extramural. Peristaltic failure is occasioned by disturbance in the nervous mechanism initiating and maintaining propulsive peristalsis (5, 23) or by interference with the efficiency of the musculature of the bowel (28) so that its capacity for contractile response to its innervation is reduced, or by both. Such nervous and muscular failure may follow trauma inflammation (30, 32, 39), or interference with the blood supply. It is obvious that circulatory embarrassment complicating the obstructed portion of the bowel greatly increases the liability to fatal consequence. When the circulation of the blood to the obstructed part is reduced, the viability of the part supplied is decreased, and if the circulatory failure to the bowel is complete enough or persists for a sufficiently long period, necrosis of the intestinal wall is the result, with discharge of the contents of the obstructed bowel into the peritoneal cavity. There is evidence, however, which suggests that it is not necessary for the bowel wall actually to perforate before bacterial invasion of the peritoneal cavity can occur (24, 19). Compromise of the blood supply is most frequently encountered when the cause of the obstruction is mechanical, such as observed in volvulus, intussusception, and closed-loop obstructions due to adhesions or hernias. In these instances the cause of the obstruction is also the cause of the circulatory embarrassment and

occurs with it, since the same mechanism which occludes the intestinal lumen also interferes with the circulation to the occluded part by impingement upon its vessels. In addition, circulatory changes and associated edema may even further impair the activity of the bowel musculature, commensurately diminishing its capacity for effective peristaltic action.

It is apparent that it is not necessary for the intestinal lumen to be completely occluded, the peristalsis to be totally inactive, or the circulation to be wholly embarrassed for stasis to supervene. Obstruction or stasis may be the net result of the concurrent operation of partial occlusion, partial peristaltic failure, and partial circulatory embarrassment, whereas the operation of any one of these factors alone might not be sufficient to produce obstruction. It is also evident that obstruction arising solely from one of the foregoing causes tends, if the obstruction persists long enough, to be accompanied by the other causal factors which increase it. In brief, occlusion of the lumen, peristaltic failure, and circulatory embarrassment tend to produce each other. For example, an obstruction produced by an adhesive band constricting the lumen of the bowel creates an occlusion which arrests the normal forward motion of the bowel content, and distention results which ultimately dilates the segment of bowel above the obstruction and interferes with the peristalsis in that segment; this further increases the stasis, so that to the original causal agent of occlusion of the lumen is added the additional factor of inadequate peristalsis. Conversely, the original cause of the obstruction may arise from peristaltic failure due to trauma; the inadequate peristalsis produces stasis of the bowel content with distention to such an extent that the bowel wall becomes turned upon itself or otherwise anatomically altered to produce an actual mechanical occlusion of the lumen; and the obstruction originally occasioned by simple peristaltic failure alone now has the additional contributory factor of actual mechanical occlusion of the lumen. In addition, the circulation to the obstructed bowel may at any time be compromised and thus further accentuate the peristaltic deficiency or the mechanical occlusion by the changes which it induces in the segment supplied. However difficult the classification of intestinal obstruction may be, a practical formulation can be devised upon the principal physiological factors alone, namely, the degree of patency of the intestinal lumen, the activity of the peristalsis, and the adequacy of the circulation. Since every case of obstruction must present pathological alteration in the intestinal lumen, peristalsis, or circulation, these may serve as common denominators by which all cases may be classified regardless of specific etiology. The fact that a primary cause of stasis or obstruction tends to engender secondary conditions which further it can also be recognized in such a system, and the progressive nature of the condition can be illustrated. Such classification is here presented in an attempt to correlate the relationship of the various types of obstruction to one another and the effect produced (Fig. 1). However produced, by occlusion of the lumen or by peristaltic failure, once stasis supervenes, its resultant signs and symptoms consequently appear. The common factor in all cases of acute obstruction is intestinal stasis which accounts for the clinical findings.

In addition, changes in the circulation and associated edema may even further impair the activity of the bowel musculature, and commensurately diminish the capacity for effective peristaltic action. The inevitable consequence of stasis of the intestinal content is distention of the bowel segment in which the stasis is extant, and it is this distention which is largely responsible for the pathological effects observed (17, 4, 34). In brief the effects of intestinal stasis or obstruction are the effects of the distention incident to the

ACUTE OBSTRUCTION OF THE SMALL INTESTINE

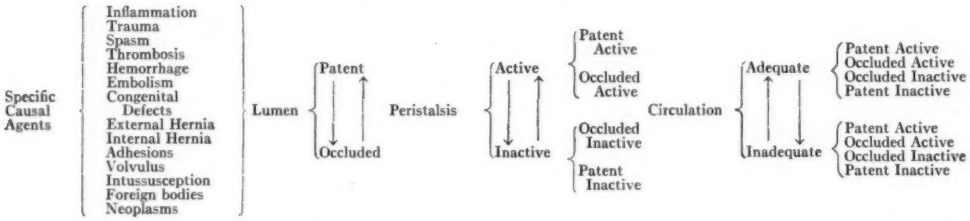

Fig. 1. Showing the schema for classification of all types of intestinal obstruction on a functional as well as an etiological basis.

stasis, and not the stasis *per se*. Distention is begun and increased in the static bowel segment by the progressive accumulation of gas and fluid within the intestinal lumen. The gas accumulation is principally accounted for by swallowed air, to a lesser degree by gaseous interchange with the blood, and to a small extent by the gascous products of bacterial action on the arrested intestinal content (25, 18). The excessive amount of fluid is the result of unabsorbed intestinal secretions from the proximal reaches of the gut above and at the site of obstruction, while it is further augmented by distention itself which serves as a stimulus to increased secretion from the walls of the bowel (17). The distention incident to stasis begins within the obstructed segment and is always progressive; it tends to involve gradually more and more of the bowel proximal to the obstruction from below upward. In the early stages when distention is moderate, it may serve as a stimulus for increased peristaltic activity. Ultimately, if unrelieved, the whole extent of the bowel above the site of obstruction becomes greatly distended, and the local effect of such distention is to impair motility further, not only in the obstructed area but in the segments of uninvolved gut above it. In addition, it causes a markedly deleterious effect on the circulation of all parts of the bowel where it is prevalent, as it impairs the nutrition and diminishes capacity for peristaltic action (36, 27, 9, 28, 13).

Further, excessive distention of the bowel, like distention of any hollow viscus, serves as an intense stimulus for subjective pain sensation referred to the abdomen. The effects of distention other than local, warrant particular consideration since their direct and indirect consequences affect the entire body. Among the general constitutional manifestations of intestinal distention is the loss of chloride occasioned by the severe vomiting and loss of fluid into the bowel (8, 2). Depletion of the blood chloride is for a time compensated for by the retention of bicarbonate to maintain electrolytic equilibrium. However, as the chloride loss continues, ultimately sodium is excreted by the kidney in increasingly greater quantities to further restore the disturbed electrolytic balance. This loss of sodium exerts a profound effect on the water balance of the body, since it is primarily the sodium which controls the retention of water in the tissues (3, 10, 11). For this reason the loss of sodium causes proportionately severe water loss from the tissue and marked dehydration results. The dehydration is further accentuated by the continued loss of fluid in the intestinal secretions of the distended bowel. Dehydration so produced is manifested by hemoconcentration and reduced blood volume. Dehydration of the blood occurs first. This loss of fluid from the circulation is made up at the expense of the interstitial fluid reservoir and when it is exhausted the fluid of the cells of the tissues themselves stands in danger of depletion (12, 33). The intracellular fluid can be reduced only slightly, if at all, without causing death of the tissue of which the cells are a part.

While dechlorination, alkalosis, and dehydration are the most important physiological alterations incident to distention of the bowel, there are, undoubtedly, in addition, other significant changes in the electrolyte pattern, as well as alteration in the non-protein nitrogen, fibrin, and urea levels in the blood (26, 14). The origin of the increase in the blood fibrinogen observed in acute obstruction is obscure beyond the fact that such increase does occasionally occur. Part of the increase may be attributed to the hemoconcentration due to dehydration. It is also plausible that the liver, the probable site of fibrinogen formation, may be stimulated in some obscure way to increase its production of this substance and liberate it into the blood. The reason for increase in the urea content of the blood is also vague, but it seems reasonable to assume that such an increase may be accounted for, at least in part, by an increased rate of tissue destruction in conjunction with some form of impairment of the excretory process.

While these changes are much in evidence in the later stages of acute obstruction when the distention has been present for some time and has involved progressively more of the intestinal segments proximal to the obstruction, they do not account for the severe shock-like syndrome frequently found when the onset of the obstruction is acute, such as is encountered in sudden mechanical occlusion of the lumen of a bowel segment or severe interference with its blood supply. The clinical manifestations observed in these instances are remarkably similar if not identical with those of shock. Considerable experimental evidence indicates that these effects are reflex in character and originate from the abnormal stimulation of visceral afferent fibers from the affected portion of the intestine. That distention alone plays a significant part in the production of these reflex manifestations is entirely probable, since distention of the gut in otherwise normal experimental animals elicits reflex responses in respiration, blood pressure, and heart rate, ranging in intensity with the rapidity and degree of the distention induced (8). The rapidity of onset of distention is in some measure dependent upon the specific cause of the obstruction. When the in-

testinal lumen is suddenly and completely occluded by some mechanical factor, such as occurs when the bowel slips beneath a constricting band, distention with its train of consequent disturbances quickly ensues. When the obstruction is caused more gradually, as by a slowly growing neoplasm which protrudes in or impinges on the intestinal lumen, the onset of the distention is slower and far better tolerated. Besides determination of the rate of onset of distention and its degree, major consideration must be given to the specific cause involved in any particular instance of obstruction because it may determine the status of the circulation to the obstructed segment.

From the foregoing considerations, it is apparent that therapeutic measures in acute obstruction are to be directed toward two general objectives: (1) correction of the local and systemic pathological disturbances which the obstruction has created, and (2) restoration of the normal bowel function by removal of its cause.

Correction of the local and systemic disturbances incident to obstruction should be begun as soon as the diagnosis of obstruction is made. The procedure consists in the restoration of the normal fluid and electrolytic balance by the administration of adequate quantities of water and sodium chloride, and the elimination of the distention incident to the stasis or obstruction by decompression of the obstructed bowel. The administration of normal saline solution is indicated both prophylactically and therapeutically; in the former case to ameliorate the dehydration and chloride loss as it occurs, and in the latter to restore the fluid and salt depletion already extant. The amount of saline solution to be administered is, therefore, dependent on the condition of the patient and will vary with the severity of the obstruction and its duration prior to treatment. A fairly dependable method for determining the amount of fluid and salt to be given intravenously has been devised; it is based upon the determination of the blood chlorides (6, 7, 31). Usually the appraisal of the obstructed patient cannot wait for such a time-consuming procedure, and external signs such as texture of the skin, appearance of the mucous membranes, and concentration of the urine must serve to indicate the amount of fluid and salt necessary. The amount of urine excreted in the presence of normal renal function affords a simple method of determining the quantity of fluid essential to maintain adequate hydration. Regardless of the replacement of fluid and salt (38, 29), life is not maintained over long periods if acute distention of the small bowel is unrelieved (2, 15). Accordingly, decompression in conjunction with fluid and salt administration is equally essential. As with fluid and salt administration, decompression is both a prophylactic and therapeutic measure in that it prevents distention in early cases and relieves it in the late (37, 1, 20, 21, 22). Decompression may be accomplished by intubation or by enterostomy.

Decompression by intestinal intubation is now a familiar subject in clinical and experimental literature. Little needs be added in discussion of the technique, except to reiterate certain points in connection with the manner in which the decompression is effected. The process of intubation consists essentially of the introduction of a double tube or a double lumen tube into the stomach, through the pylorus, and into the small intestine. At the end of the tube is a perforated metal tip a few inches proximal to which is an inflatable rubber balloon. There are numerous perforations in the space of tube between the tip and the balloon and above. When the tip of the tube is well past the pylorus, so that the balloon also lies in the duodenum, the balloon is inflated, and continuous suction applied. Such inflation causes pressure on the walls of the intestine which serves as a stimulus to peristalsis and at the same time as an object of sufficient bulk and diameter for the increased peristaltic activity to propel along the lumen. The tube therefore progresses within the lumen as long as the latter is sufficiently patent to allow its passage and there is adequate peristaltic activity to carry it. As the tube progresses, the suction applied to the external end creates a constant negative pressure within the tube which causes the intestinal content, gas, fluid, and particulate matter to pass into the holes in the tube provided for the purpose. The intestinal content is thus drawn from the lumen of the bowel into the tube and thence to the outside, the process being a continuous one. As the tube withdraws the accumulation of static intestinal content from each successive loop of intestine, the distention within that segment due to gas and fluid is reduced. Reduction of the distention allows in a large measure the resumption of peristaltic function within the decompressed segment so that it becomes ultimately adequate to carry the tube farther to the next distended loop in which the process is repeated. In this way segment after segment of the distended bowel proximal to the obstruction is progressively decompressed, resumes peristaltic function, and propels the tube onward. If the obstruction is caused by an occlusion of the lumen, the tube progresses to the point of occlusion where further

progress is impossible and it remains there. Until the cause of the occlusion is removed, the tube continues to drain the constantly recurring accumulation of fluid and gas at the site of the obstruction and in the reaches of the bowel above it. The distention so reduced is in this way prevented from recurrence. If the obstruction is not caused by mechanical occlusion of the lumen, but by failure of peristalsis also, such as is commonly encountered in postoperative adynamic ileus, the mechanism of decompression is much the same. The tube is passed by the yet active bowel to the inactive segment where there is insufficient peristalsis to carry it farther. At this point it withdraws the accumulated gas and fluid in the proximal portion of the inactive segment, and prevents further accumulation within the latter. Reduction of the distention and prevention of its recurrence eliminates its mechanical effects on the walls of the inactive portion of the bowel and promotes a more rapid return to normal peristaltic function. When this occurs the tube is carried farther into the inactive segment, decompressing as it progresses, until such time as the inactive bowel is completely relieved and returns to adequate peristaltic function.

Much has been said concerning enterostomy in cases of intestinal obstruction. Before the use of decompression by intubation this was the only available form of direct decompression short of correction of the cause of the obstruction. Difficulties associated with the indiscriminate use of this method of decompression caused many to condemn its use. The objections which have been raised concerning this operation center about the fact that (1) it does not correct the cause of the obstruction, (2) it produces an intestinal fistula, (3) it drains but a single loop of bowel in the case of adynamic ileus, and (4) it may exaggerate the cause of the ileus either because of the trauma of the operation or by causing additional adhesions. Even in the face of these facts there remains an occasional case of mechanical obstruction in which enterostomy is justified. In the presence of adynamic ileus there is no justification for enterostomy since it drains but one loop and nearly always increases the amount of ileus present.

From the standpoint of simple mechanics, an enterostomy performed above the point of obstruction permits decompression at the ideal site, and compares favorably with long tube suction so far as emptying of the bowel content is concerned. There is, however, much greater loss of fluids and salt from an enterostomy than from suction drainage applied at the same point. A possible explanation of this is that there is more stimulation to activity of the gut in the case of enterostomy than in tube drainage and that the tube drains only when fluid or gas passes the openings in the tube, and this only partially because of the rapidity of propulsion past the drainage site. It is obvious that enterostomy for obstruction of the small bowel is a procedure to be used rarely, and then only after careful consideration of the deficiencies of the method as well as its advantages.

The optimal time for attempting the second therapeutic objective, restoration of the normal bowel function by removal of the cause of the obstruction, depends upon the condition of the patient and the type of the obstruction. The therapeutic objective of removal of the cause of the obstruction involves the decision as to whether or not the cause can be relieved by surgical intervention, and if such is the case, at what time the surgical procedure is to be attempted. It is obvious that no case is to be subjected to surgery when shock, dehydration, or other concomitants of obstruction of a sufficient degree to jeopardize recovery are present. Therefore it is absolutely essential in all cases considered surgical, even when the indication for surgery is most immediate, to improve the patient's general condition to the point where operation can be withstood, before it is attempted. This is accomplished by the standard methods of blood transfusion, intravenous infusion, the application of heat, and administration of indicated drugs. The most urgent consideration concerned in the question of immediate or delayed surgery is whether or not the blood supply to the obstructed bowel segment is intact.

Circulatory embarrassment may occur simultaneously with the obstruction as when the bowel and a part of its mesentery are mechanically compressed by a constricting band or stricture. It may ensue subsequent to the obstruction, or it may itself be the primary cause of the obstruction, as in mesenteric thrombosis. Distention of the bowel incident to simple obstruction if prolonged and of a marked degree undoubtedly produces circulatory changes of a deleterious nature in the distended area of the intestine. The most important circulatory effects are, however, concerned with the mesenteric vessels. Compression, hemorrhage, thrombosis, or embolism of the mesenteric radicals deprives the area of the bowel supplied by the affected vessels of their blood supply with consequent loss of viability and ultimate necrosis. The inevitable results of the circulatory embarrassment are tissue anoxia, loss of viability, and necrosis, with consequent passage

of the toxic intestinal content into the peritoneal cavity. Few stronger indications for prompt surgical intervention exist than acute intestinal obstruction complicated by a co-existing circulatory embarrassment. Once the diagnosis of mesenteric circulatory interference to the obstructed segment is made, early laparotomy is imperative. To temporize is to court the disaster of peritonitis. In general, the surgical procedure of election depends upon conditions obtaining at the time of operation. If the bowel is viable, the cause of its impaired circulation is removed if possible and the segments are returned to the abdomen with simple closure. If the bowel is no longer viable, resection of the necrosed portion with subsequent anastomosis is obligatory.

When it is apparent that the cause of the obstruction can be relieved by surgery, but no embarrassment of the circulation of the obstructed portion exists, considerably more latitude in treatment can be allowed. The therapeutic effort is then best directed primarily toward the objective of relieving the local and systemic pathological effects of the obstruction and delaying any contemplated surgical attack on the cause of the obstruction until the most opportune time. In brief, in cases of obstruction presenting no circulatory embarrassment of the bowel which are properly treated by decompression and the administration of fluid and salt, surgical relief of the cause can be made practically an elective procedure.

When the cause of the obstruction cannot be relieved by surgery, as in obstruction caused by peristaltic failure alone, the entire therapeutic effort must be directed toward the therapeutic objective of relief of the pathological effects of the obstruction by decompression and the administration of fluid and salt, in order to create conditions most favorable for the return of normal bowel functions.

SUMMARY

Acute obstruction of the small intestine is essentially a condition of stasis of intestinal content of such duration and degree that it produces general as well as local pathological changes, whatever the specific cause. Such stasis of intestinal content can be produced only by any one, two, or all of three factors, namely, occlusion of the intestinal lumen, failure of propulsive peristalsis, and embarrassment of the mesenteric circulation. The inevitable result of obstruction is distention of the obstructed segment from the accumulation of fluid and gas within the bowel. Distention is the chief causal factor of the occurrence of dehydration and dechlorination and a probable agent in the production of the shocklike syndrome frequently encountered. Correlation of the above factors may be illustrated by the schema shown at bottom of page.

The treatment of acute obstruction of the small intestine should be directed toward two therapeutic objectives—the relief of the local and general pathological disturbances created by the obstruction, and the removal of the cause. The first objective is accomplished by supplying fluid and sodium chloride in conjunction with decompression. Decompression is best accomplished in the great majority of cases by intestinal intubation and only in very rare instances by enterostomy. The second therapeutic objective, the removal of the cause, may or may not be amenable to surgical intervention. If it can be relieved surgically, the question as to when the surgical procedure is to be carried out depends on whether or not the blood supply to the obstructed bowel is embarrassed. In instances where such circulatory embarrassment exists, immediate operation is indicated as soon as the patient's condition can be improved to present a reasonable chance of withstanding the operative procedure. Cases diagnosed early, before dangerous distention, dehydration, and dechlorination have occurred, can be operated upon with little or no preliminary decompression or hydration. In instances in which the cause is amenable to surgery but no circulatory embarrassment exists, surgical removal can be delayed almost indefinitely and made an elective procedure, with proper decompression and maintenance of the fluid and electrolytic balance. In instances of obstruction in which the cause is not amenable to surgical removal, e.g., patent inactive obstruction, expectant treatment by decompression and maintenance of the fluid and electrolytic balance is to be carried out while awaiting the return of normal bowel function.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Lyons, C.: The Treatment of Staphylococcal Cavernous Sinus Thrombophlebitis with Heparin and Chemotherapy. *Ann. Surg.*, 1941, 113: 113.

The author reports the survival of 2 consecutive patients with bacteriemic staphylococcal cavernous sinus thrombophlebitis treated with a combination of chemotherapy and heparin. Both patients entered the hospital with this condition subsequent to nasal furuncles of five and seven days' duration. Heparin was administered at once in sufficient amount to maintain the clotting time of the blood at ninety minutes, which level was maintained for eighteen days or until repeated blood cultures were negative. Sulfapyridine was chosen to start the treatment since it diffuses into the spinal fluid more effectively than sulfathiazol. The latter drug was then substituted since it seemed to be the drug of choice for this type of infection. The blood level of both drugs was maintained at 5 mgm. per cent for prolonged periods of time, despite apparent clinical improvement and the cessation of the bacteriemia. Omission of the sulfapyridine in the first case after apparent recovery was followed by the development of a chronic staphylococcal meningitis, which required the administration of sulfathiazol for a period of four months. In the second case treated with constant, prolonged chemotherapy (sulfapyridine followed by sulfathiazol), no meningitis developed. Cranial nerve palsies, demonstrable during the height of the disease, cleared remarkably during convalescence. STANLEY ROBBINS, M.D.

EYE

Paez Allende, F.: The Surgical Removal of the Crystalline Lens without Iridectomy (Ectomía quirúrgica del cristalino sin iridectomía). *Semana méd.*, 1941, 48: 249.

The author has operated upon 15 cases of senile cataract in one year, using Dimitry's suction cup in some and in others the capsular forceps of Green or Arruga, or he has used the method of extracapsular extraction with lavage of the anterior chamber with physiological serum. He has always left the iris intact, and yet the frequently mentioned and greatly feared hernia of the iris has never occurred. Nowadays, this accident is avoided by the actual surgical procedures and the use of preventive measures: prolonged immobilization of the eyelid, suture of the edges of the wound, solid protection against any traumatism, removal of all soft masses of the lens by total extraction and lavage, better and complete clinical study of the cases, and operation in bed to avoid the dangers of transfer for the patient. There has been no case of postoperative hemorrhage in the anterior chamber and vision is good in all patients. Slight pupillary decentration has occurred in only a few cases and no loss of vitreous substance has been observed.

The method has included a purgative on the eve of the intervention and a coagulant some hours before, or pre-operative autohemotherapy. Complete anesthesia of the orbicular muscle of the eyelid, preferably prolonged for several days by the addition of 0.5 c.cm. of alcohol to 6 or 7 c.cm. of 2 per cent novocaine solution without adrenaline, is produced, which is followed by hypotonic retro-ocular anesthesia, external canthotomy, and repeated cocaine instillations. Cocaine-euphthalmine is given one hour previously and adrenaline is injected under the conjunctiva to obtain lasting mydriasis. A classical incision which gives a short scleroconjunctival flap is used, and extraction of the lens performed; suture is done with the finest possible silk. One per cent eserine in oil is administered, and palpebral occlusion is obtained by pulling the upper eyelid down by means of a suture previously inserted in its border for traction purposes during the operation.

The term iridectomy is inappropriate because the iris is never excised completely: partial iridectomy would be more to the point. However, this procedure should be banished from the cataract operation because prolapse of the iris does not occur if the previously mentioned measures have been taken. The intact iris offers great advantages, such as the preservation of the sphincter, clear images, and less danger of hemorrhage.

Hernia of the iris used to occur in extracapsular extraction in which remnants of lens were left behind; they acted as foreign bodies and tended to issue from the eye, pulling with them the iris which prolapsed between the edges of the wound that were simply coapted but not sutured; these edges were easily everted, their raw surface acting in a reflex manner to cause movements or violent contractions of the occluding muscle of the eyelid, and the force transmitted postero-anteriorly tended to push the iris outward. All this is avoided by the present method, and the use of a solid protector, which eliminates possible involuntary blows on the eye, is another factor which prevents hernia of the iris. In addition, the transfer of the patient from the operating table to the wheeled stretcher, transportation, and transfer from the stretcher to the bed are other factors in the occurrence of hernia of the iris. The eserine instilled at the end of the operation contracts the pupil and helps to eliminate the possibility of its prolapse. The opinions of various well known auth-

ors are cited as supporting these concepts. The 15 cases are reported. RICHARD KEMEL, M.D.

Duggan, W. F.: Acute Retrobulbar Neuritis as a Manifestation of Acute Localized Tissue Anoxia; Treatment with Vasodilators. *Arch. Ophth.*, 1941, 25: 299.

In this scholarly article which, when presented anonymously, was awarded the Lucien Howe Prize in 1940, the author attempts to prove that acute retrobulbar neuritis is an acute vascular catastrophe in the optic nerve or chiasm which can have many causes. According to his theory the immediate effect is acute localized tissue anoxia and loss of function. The changes in the arterioles and capillaries are the final common routes through which different etiological agents produce the same clinical and pathological picture. The pathological picture is similar to that of shock and histamine poisoning. Excessive arteriolar constriction (spasm) leads to increased capillary dilatation and permeability and results in localized edema, tissue anoxia, and loss of function in the involved tissue.

The probable correctness of this premise is substantiated by the clinical cases reported. In 65 eyes with retrobulbar neuritis which were treated by standard methods, 63 per cent had a final vision of from total blindness to 20/100, and 21 per cent had a final vision of from 20/30 to 20/20; 10 eyes were unchanged or became worse with treatment, and 23 eyes had optic atrophy. It was found that there was no great tendency for the eyes to improve spontaneously and that nasal sinus surgery was nonspecific in its action.

Twenty-nine patients were treated with vasodilators on the basis of the theory here enumerated. No other treatment was employed in these cases. None of the eyes became worse under treatment. Before treatment, 17 eyes had vision of from hand movements to 20/100; after treatment 25 eyes (86.2 per cent) had vision of from 20/30 to 20/15. Of the 4 eyes with final vision of less than 20/200, 2 were seen sixty days after onset of the condition, and 2 did not have further treatment. For the 25 improved eyes, the average duration of loss of sight was sixteen days and the average time required for the attainment of their best final vision was nine and seven-tenths days, as compared to thirty-four and three-tenths days in the cases not treated by vasodilators.

Papilledema and multiple sclerosis were not of unfavorable prognostic significance. The earlier the treatment was begun, the better were the visual results. There was believed to be no necessity for operating on sinuses or other foci of infection unless the local condition of the focus required it *per se;* the retrobulbar neuritis was not considered an indication for operation. None of the author's patients was hospitalized for the treatment. While intravenous administration of sodium nitrite, intramuscular administration of acetylcholine, and inhalations of amyl nitrite were all found to be of value, the author believes that the intravenous use of sodium nitrite is most effective. WILLIAM A. MANN, M.D.

Dandy, W. E.: Results Following the Transcranial Operative Attack on Orbital Tumors. *Arch. Ophth.*, 1941, 25: 191.

A series of 24 intra-orbital tumors that have been operated on by the transcranial route is reported. Five, or 21 per cent, of these tumors were confined to the orbit, while 18, or 79 per cent, were combined intra-orbital and intracranial growths; 1 of the former and 2 of the latter were metastatic. With an additional 7 cases, in which autopsy was performed but this operation had not been employed, the percentages were even more pronounced, 16⅔ per cent and 83⅓ per cent, respectively. The pathological features of the tumors are discussed.

The operative attack, proposed in 1921, is through a transcranial (hypophyseal) approach. The roof of the orbit is removed after evacuation in the cisterna chiasmatis; retraction of the frontal lobe then provides sufficient room.

The operation is offered not only for all combined intra-orbital and intracranial tumors but for growths that are restricted to the orbital cavity. As a matter of fact, it is rarely possible before operation to be certain whether or not the tumor also lies within the cranial chamber, as so many of them do (roughly 75 to 80 per cent in this series). This condition should therefore be assumed on the law of probability.

For tumors confined to the orbit this operation offers a far better exposure than is possible by any other approach. There is, therefore, much less chance of injury to the extra-ocular muscles, their nerve supply, the optic nerve, and the ophthalmic vessels by this approach.

It offers the only hope of a permanent cure when the tumor is in both cavities, and when the condition is incurable it offers the maximum palliative result.

The operative risk in safe hands should be very low (4.1 per cent in this series) in regard to both tumors confined to the orbit and those with intracranial extensions. Prior exenteration of the orbit or removal of the eyeball will prevent the utilization of this operation, because the orbital tissues will be infected. LESLIE L. MCCOY, M.D.

EAR

Lillie, H. I.: The Diagnostic Significance of Partial Paralysis of the Facial Nerve in Chronic Suppurative Otitis Media and Mastoiditis. *Ann. Otol., Rhinol. & Laryngol.*, 1941, 50: 38.

Partial paralysis of the facial nerve invariably has been looked upon as being caused by an intracranial lesion which involves the nuclei. When such paralysis occurs in the absence of chronic suppurative otitis media, there is little doubt about the situation of the lesion. However, only a few references have been found in the literature to suggest that when partial paralysis of the facial nerve occurs in the

presence of chronic suppurative otitis media, the lesion involves a certain portion of the nerve trunk within the temporal bone.

The situation of a lesion causing facial paralysis may be determined accurately anywhere in the course of the pathway of the nerve from the lower end of the precentral cortical gyrus to the innervation of the peripheral muscle when disease of the middle ear is not present. Cerebral lesions, because they cause the upper neuron type of paralysis, spare the occipitofrontalis, orbicularis palpebrarum, and corrugator supercilii muscles. Lesions in the upper part of the pons would be accompanied by involvement of the pyramidal tract on the same side. A lesion in the lower part of the pons should produce involvement of the opposite side. If the lesion is in the medulla, the eye on the same side should turn inward from involvement of the sixth (abducent) nerve, and there should be an accompanying effect on the pyramid and fillet. Lesions proximal to the geniculate ganglion usually cause impairment of hearing and equilibrium. Involvement of the geniculate ganglion (Ramsay Hunt syndrome) is manifested by herpes of the external auditory canal and the adjacent auricle. If the lesion is situated distal to the geniculate ganglion, the resulting paralysis is of the lower neuron or flaccid type and involves all of the facial muscles. All are familiar with the typical clinical picture of facial paralysis. If sensations of taste are absent from the anterior two-thirds portion of the tongue, the lesion is situated between the geniculate ganglion and the point at which the chorda tympani leaves the nerve trunk to pass through the middle ear. Involvement of the branch innervating the stapedius muscle or the chorda tympani is not always easy to determine in chronic suppurative otitis media.

It is apparent that for the patient to have the aforementioned syndromes, the entire trunk must be affected by the lesion. That complete involvement of the nerve trunk is not always present in peripheral lesions causing partial paralysis has been clinically observed.

Whether partial facial paralysis is encountered pre-operatively or postoperatively in a given case, the portion of the face involved may provide the information necessary to determination of the site of the lesion.

Of most importance to otologists in the evaluation of pathological factors are the anatomical relationships of the facial nerve within the middle ear. The aural surgeon seems to be concerned with injury of the nerve below the level of the horizontal canal more often than he is with the promontory of the middle ear. Pathological lesions are more likely to affect the facial nerve under the anterior end of the prominence of the horizontal canal and near the eminentia pyramidalis. Necrosis of the bone in this region and resorption of the bone caused by the insidious destructive effect of cholesteatoma are the two main pathological causes of involvement of the facial nerve.

The clinical evidence presented seems to show that partial facial paralysis occurring before or soon after operation on the ear has diagnostic significance in the location of the part of the nerve trunk involved. The institution of early operative relief for the compressed or injured nerve seems to be a rational method of treatment. Partial facial paralysis occurring in the presence of chronic suppurative otitis does not necessarily mean that the lesion causing the paralysis is situated in the intracranial nuclei.

Williams, W.: Otogenous Meningitis. *Australian & New Zealand J. Surg.*, 1941, 10: 249.

Williams investigated a series of 40 cases of diffuse leptomeningitis of otitic origin which occurred at the Victorian Eye and Ear Hospital during the past five years. Of the 40 patients, 36 died and 4 recovered. The sexes were represented by 28 males and 12 females. In 28 cases, that is, in almost three-quarters of the total, meningitis followed acute otitis, the average age of the patients being twenty-two years. In 10 cases the otitis was chronic; in the remaining 2 cases it was of a few months' duration and might be termed subacute.

In this series, the focus of infection was extralabyrinthine in 36 cases and labyrinthine in only 4. There was evidence that in the extra-labyrinthine group there were at least 5 cases of petrositis, 6 of cerebral abscess, 2 of cerebellar abscess, and 3 of sinus thrombosis. Streptococci were present in 14 cases and pneumococci in 5. In all 4 cases in which recovery occurred the streptococcus was the infecting organism.

In 31 cases a Schwartze mastoid operation was the first procedure and in others a radical mastoidectomy was the operation chosen. Further exploration was frequently found necessary. In the great majority of cases the exposed dura and sinus appeared normal. The labyrinth was drained in 7 instances, the jugular vein ligated three times, and Dandy's cisternal drainage operation was performed once.

Medical treatment, apart from the administration of free fluids and the occasional use of hypotonic saline solution, and sedatives, consisted mainly in the administration of anti-streptococcal serum and lumbar puncture; 13 of the 40 patients received serum. Sulfanilamide or an allied drug was used in 4 of the later cases of the series; in 1 of these recovery occurred. NOAH D. FABRICANT, M.D.

NOSE AND SINUSES

Teed, R. W.: Primary Osteoma of the Frontal Sinus. *Arch. Otolaryngol.*, 1941, 33: 255.

Two cases of osteoma primary in the frontal sinus are reported, several interesting historical cases are reviewed, and a reproduction of the first illustration of a patient who had had osteoma is shown. A survey of the literature revealed 321 cases, a figure which indicates that osteoma, while not common, certainly is not rare. About 40 per cent of all osteomas of the accessory sinuses originate in the frontal

sinus. The disease is essentially one of youth, by far the greatest incidence occurring in the second and third decades. It attacks males more frequently than females. The various theories as to its causes are reviewed, the conclusion being reached that no completely satisfactory explanation has as yet been devised. The pathology is reviewed briefly, four main types of osteoma being described.

In connection with the diagnosis of osteoma it is pointed out that the first case to be recognized by roentgen examination was reported by Coppez in 1899. The complications caused by the growth of the neoplasm into the nasofrontal duct, the neighboring sinuses, the orbit, and the cranial cavity are discussed as illustrative of Gerber's statement that osteomas are benign histologically but malignant clinically. Treatment is then discussed, and statistics are shown, which indicate that in the preantiseptic era the surgical mortality was 31.2 per cent, while since 1875 it has been only 3.7 per cent. The opinion is expressed that operation should be carried out while the tumor is small, rather than after the appearance of symptoms of extrasinal extension. If infection is present, the resort to surgery should be delayed until the infection is quiescent.

JOHN F. DELPH, M.D.

Arons, I.: Neoplasms of the Antrum, Nasopharynx, and Hard Palate. *Laryngoscope*, 1941, 51: 61.

The nasal passages and their accessory sinuses, including the hard palate, are the seat of a series of neoplastic formations, benign and malignant. The frequency of these tumors is great, since this region is so often afflicted by inflammatory or irritating processes which might form the basis of tumor growth. Before a decision regarding treatment is made, the clinical diagnosis should be confirmed by pathological differentiation, whenever and wherever it is possible, since successful treatment depends on accurate identification of the tumor.

Taking into consideration the magnitude of material, the author limits his discussion briefly to neoplasms of the antrum, the nasopharynx, and the hard palate. These three regions present to the radiotherapist a similar problem, since all of the conditions which are found are treated primarily by external irradiation. The portals are usually of limited dimensions and, on the whole, the resultant complications within the course of treatment are of a similar nature.

Since the pathological differentiation of tumor growth in the antrum has become more precise, the means of treating this condition are, consequently, more accurately defined. Radical surgery, with its unfortunate consequence of mutilation, should be considered only if the condition does not permit any other method. The treatment of choice is a combination of surgery and irradiation. Nasopharyngeal tumors present to the physician the problem of diagnostic differentiation, and they are quite frequently not properly diagnosed until in an advanced stage. Because of their radiosensitivity the proper method of treatment is external irradiation and contact radium application.

A fibroma of the nasopharynx should be treated only conservatively, to relieve the pressure symptoms, as these growths tend to regress spontaneously with the completion of skeletal developments. Pathological differentiation of growths of the hard palate will determine the method of treatment procedure. If the tumor is of mixed cell origin and encapsulated, excision is the best method. If the tumor is malignant, and is still operable, pre-operative irradiation, excision, and postoperative irradiation is the method of choice. If the tumor is inoperable, irradiation both by x-rays and radium must be carried out.

NOAH D. FABRICANT, M.D.

MOUTH

Kazanjian, V. H.: The Interrelation of Dentistry and Surgery in the Treatment of Deformities of the Face and Jaws. *Am. J. Orthodont. & Oral Surg.*, 1941, 27: 10.

The successful treatment of face and jaw injuries requires the intelligent co-ordination of dental and surgical procedures. During the World War the development of surgical prosthesis proved of great benefit to correction of war mutilations.

Mandibular prognathism may be due to hereditary causes, trauma, or disease. It may be treated surgically in carefully selected cases by removing a section of the bone from each side of the body of the mandible or by cutting through the rami and pushing the jaw back to a desirable position where it is immobilized. Twenty cases have been operated on—patients from fourteen to twenty-six years old with an average hospitalization period of fourteen days. A marked improvement of facial contour resulted in all cases as well as improved function. An opening of the bite is more likely to follow the ramus operation, but it is a simpler operative procedure.

In retrusion of the mandible an L-shaped or diagonal cut through the body of the mandible permits a lengthening of the jaw while contact is retained. The jaw is fixed in its new position by intermaxillary wiring or splints for about two months. Bone grafts anterior to the chin may also be of help.

Secondary deformities of cases of cleft palate are amenable to surgery, but dental and orthodontic treatment will often be employed beneficially.

Five interesting case reports illustrate the procedures described. CHARLES W. FREEMAN, D.D.S.

Thoma, K. H.: The Use of Radiopaque Diagnostic Media in the Roentgen Diagnosis of Oral Surgical Conditions. *Am. J. Orthodont. & Oral Surg.*, 1941, 27: 64.

The author illustrates from experience with a series of representative cases the additional aid that can be secured in oral surgical diagnosis by the use of lipiodol and iodochloral. He describes the physical characteristics of these two substances, each of which is iodine combined chemically with oil for radiopacity.

Fig. 1. Periodic swelling of the parotid gland. Sialograph shows stricture and dilatation of the ducts to be cause.

Forty years ago lipiodol was used therapeutically and only recently has its diagnostic value been realized. It is non-irritating to the tissues and is contraindicated only in the presence of an idiosyncrasy to iodides, in acute active tuberculosis, and in debilitated patients. A brief summary of the widespread uses of lipiodol in general roentgen diagnosis is given.

Iodochloral, a recent American product, is considered more stable than lipiodol and can be heated in an autoclave without decomposition. The tissues in contact with it are not irritated because of the firm character of the organic linkage between the oil and the halogens. The therapeutic usefulness of iodochloral, as of lipiodol, depends probably on its mechanical action in displacing mucopurulent secretions in infected cavities.

The essential instruments necessary for the use of these substances are a syringe, and suitable needles and cannulæ. A sharp needle is preferable for injecting cysts and nasal sinuses as it can be forced through the thin bony wall and it will cut through the lining membrane without separating the membrane from the bone. When fluid is to be aspirated from a cyst, a syringe with detachable needle is preferable, as this eliminates the need for repeated withdrawal of the needle. For the injection of the ducts of the salivary glands a blunt cannula is required. For use in the submaxillary duct a curved cannula is chosen; for the parotid duct a straight or curved cannula may be used.

The author presents roentgenograms and photographs of several cases in which the x-ray diagnosis was aided by the use of radiopaque substances. In each case a detailed description of the technique of injection is given. Thus, the origin of fistulas of the face from bone, tooth, or soft tissue is traced, the solid or cystic character of the tumor of the jaw is determined, the differentiation of true cysts of the maxilla from septa in the antrum is proved, and various pathological conditions in the paranasal sinuses are visualized. Often the information thus gained is useful for the planning of the operative procedure.

Sialography, which is x-ray study of the salivary glands by means of radiopaque substances injected into the ducts, is useful in detecting causes of inflammation in these glands as well as in outlining cysts or tumors in them. As the interpretation of sialographs requires an accurate knowledge of the anatomy of these glands, the author describes and presents illustrative drawings of the anatomical relationship and normal variations of the parotid, submaxillary, and sublingual glands.

Several cases of lesions of the salivary glands are presented and a detailed description of the technique of injection by means of a fine blunt cannula is given.

Figure 1 is a sialograph of a patient who complained of a swelling behind the jaw at mealtime. A stricture can be seen in the parotid duct with dilatation of the ducts behind it.

BRADFORD CANNON, M.D.

Brown, J. B., and Byars, L. T.: Malignant Melanomas. *Am. J. Orthodont. & Oral Surg.*, 1941, 27: 90.

The authors re-emphasize the rapidly fatal character of malignant melanoma, the uncertainty of its origin, and the diversity of its occurrence. Because of certain confusion regarding treatment they present some guiding principles of such treatment. Since a large percentage of such malignancies arise in pigmented nevi, destruction of the pre-cancerous lesion should be the goal. They recognize two types of nevi, (1) the congenital or neuronevus which is flat and not heavily pigmented and seldom becomes malignant, and (2) the nevus that develops any time during life, increases in size, and often becomes malignant. They state that any pigmented or non-pigmented moles subjected to chronic irritation, or showing evidence of growth, increase in vascularity, change of color, repeated infection, or of ulceration, and all smooth, coal-black nevi should be removed. The dangers of "fooling" with the common mole, with acids or incomplete electrodesiccation are stressed. The removal should be quick, painless, non-irritating, thorough, and with minimum handling of the growth. A method which fulfills these requirements is described by the authors (Fig. 1).

The diagnosis of the change from an innocent pigmented nevus to a malignancy is made on the basis of an increase in elevation or surface area, a deepening of pigmentation, an increase in vascularity, or an apparent chronic infection. An entirely new warty growth in the skin or under the nail may be difficult to diagnose as a melanoma but such neoplasms should be considered malignant. Melanin may or may not be present in these melanomas.

There is general agreement that malignant melanoma is resistant to radiation. The treatment of choice in melanoma of the face and head is surgical, and the operative removal, usually with a cautery or diathermy, must be quick, with a minimum handling of the lesion, and should include a generous margin of surrounding normal skin and subcutaneous tissue down to the fascia. This excision may require later repair with skin grafts or pedicle flaps

a b c

Fig. 1. a. Illustration of an ugly, slowly growing mole of the lip. b. The site of the mole after cautery removal. c. The final healing result with the practically invisible scar.

The usual cause of death in cases of malignant melanoma is rapidly occurring metastases rather than extension from the local lesion. Five possible causes exist:

1. There may be recurrence of the initial lesion.
2. Metastasis may occur in the adjacent skin.
3. There may be generalized rapidly fatal skin metastases which possibly have their origin in the pituitary-melanophore relationship.
4. Visceral metastasis may occur in a matter of months or years even with the local lesion cured. The patients with late metastasis seem to have the original lesion in the chorioid of the eye.
5. There may be local lymph-node metastasis. Only in this last group is there hope of cure.

Therefore, if the primary lesion is located so that its lymph drainage is fairly well predictable, a prophylactic dissection should be done.

The authors present 11 advanced cases of malignant melanoma; among them was a case with seven-year cure following radical neck dissection for metastatic melanocarcinoma, and a case of primary melanoma of the parotid gland with secondary skin metastasis in which the patient was alive and well four years after radical removal. In a third case, a melanocarcinoma of the cheek with neck metastasis, which necessitated excision and grafting of the initial lesion, radical neck dissection, and subsequent removal of a parotid metastasis, the patient was alive after fifteen months. BRADFORD CANNON, M.D.

NECK

Haldre, J.: Contributions on the Roentgen Therapy of Malignant Strumas Treated or Not Treated by Operation (Beitrag zur Roentgentherapie der operierten und unoperierten Struma maligna). *Roentgenpraxis*, 1939, 11: 615.

Malignant struma is rare. The frequency at the Institute varies between 0.09 and 1.04 per cent. In goiter-free regions it is more common. At the Central Roentgenological Institute in Tartu (Dorpat) there were a large number of cases over a period of eleven years, 34 cases being observed. The age of the patients varied between twenty and seventy-eight years. Others have observed patients under twenty years of age, the youngest being seventeen. The majority of cases seem to occur in patients over fifty years of age; however, statistics vary. Portmann believes that only the clinical condition is conclusive evidence of this disease; histological diagnosis may be erroneous. The author reports a case of apparent Basedow goiter which was treated by partial excision and showed malignancy upon histological examination. This was confirmed by early metastases. Histological examination is necessary to determine the type of tumor.

Thyroid sarcoma, which is very rare, has a poor prognosis. According to Walter, who observed 28 cases, irradiation alone gave better results than operation, while operation followed by irradiation never produced freedom from symptoms. The Holfelder Institute had even better results in 37 cases; 1 patient lived three years, and another four years. It would seem that the Holfelder technique of gradually decreasing the doses and using a standardized procedure is superior.

The author's cases are remarkable in that mostly women were affected, which corresponds with the condition in Estonia where goiter is infrequent. In 24 cases the diagnosis was made histologically; in 10 of these the same diagnosis had been made clinically. No patient was sent away on account of far advanced findings. Operated cases were irradiated postoperatively, and 10 cases had roentgen therapy only. Since 1930 fractional irradiation has always been used. Telangiectasis occurred very seldom. Before 1930 intensive irradiation consisted of 170 kv. through 0.5 mm. of copper filter and 25 r/min. of flow. After this treatment there always was pigmentation and telangiectasis. The treated cases which were already hopeless on admission invariably terminated fatally within a few months. Twelve of the 34 patients died, 7 in the first year. Among the 15 operated cases the prognosis is very good. Only 1 patient died two years after operation because of a

lung metastasis. The patients received on the average two irradiations as after-treatment with an interval of six weeks. There was a total of 13 cases with three-year cures, 12 of the patients having lived three years or longer. The prognosis of the cases not treated surgically was less optimistic. Of 10 patients only 4 are living. These patients were all given large doses of irradiation until satisfactory results were obtained. At first the condition always became worse, but in ten days this was overcome. The authors protect the irradiated skin with a cloth impregnated with paraffin oil. Of the 4 living patients, 3 have been followed up for two years, and 1 for seven years. The irradiation pains have subsided and the general condition is good.

The prognosis was considerably better in the operated cases in which inoperability was found at the time of operation; of 8 patients, only 4 died. The survivors, 2 of whom have been observed for two years and 1 for three years, are completely symptom-free; these patients received at least two irradiations each. There are 22 (64.7 per cent) of the 34 patients living. This percentage suggests that the combined operation and roentgen irradiation give the best results. On account of the inoperability, the incompletely operated cases have a better prognosis. This agrees with the findings in 658 cases reported by Pemberton of the Mayo Clinic. Ten per cent of the patients who were not operated on lived five years or more. Apparently the cells respond well to treatment. Holfelder also emphasizes that operation followed by roentgen therapy is better than operation followed by radium therapy, and that surgical treatment alone produces extraordinarily poor results.

(Franz). Richard J. Bennett, Jr., M.D.

Jelke, H.: Hyperparathyroidism. A Case with Severe Kidney Changes, Treated by Parathyroidectomy (Ueber Hyperparathyreoidismus. Ein operierter Fall mit schweren Nierenveraenderungen). *Acta med. Scand.*, 1940, Supp. 114.

Jelke gives a survey of the reported cases of osteitis fibrosa generalisata treated by parathyroidectomy; they number about 200. He discusses the various clinical types of the disease, and the well known case of the first parathyroidectomy of Mandl. He then reports the following case:

A woman of fifty-eight was referred to him for surgery because of osteitis fibrosa generalisata with typical roentgen findings. There was an increased blood calcium level (19 mgm. in 100 c.cm.). There were numerous calcifications in the kidney parenchyma, as well as albuminuria, azotemia (non-protein nitrogen amounting to 71 mgm. in 100 c.cm.), and infection of the urinary passages. At operation, an adenoma of the left parathyroid gland, measuring 31 by 16 by 15 mm., and the normal right parathyroid gland were removed. The tumor was composed of multiple adenomas containing aqueous cells, which were devoid of fat. Postoperatively, there was increasing renal insufficiency with oliguria and azotemia (non-protein nitrogen amounting up to 171 mgm. in 100 c.cm.) and vomiting, but after the parenteral administration of fluids and salt, the patient's condition improved. The blood calcium level fell promptly after the operation; it was 7.7 mgm. in 100 c.cm. on the sixth, and 6.7 mgm. in 100 c.cm. on the twenty-fourth postoperative day. At this time, there was a convulsion with the signs of tetany. After administration of calcium and Vitamin D this disappeared, and the blood calcium level remained low, near the tetanic level. It was not before some months that it became normal.

Already one month after operation, improvement of the bone changes could be shown roentgenologically. After two years numerous cystic defects found before operation had disappeared and had been replaced by fairly normal bone. Also the kidney calcifications had been reduced, both in size and number. After operation the general condition improved markedly. There was only a trace of albumin in the urine, and both the azotemia and the urinary infection cleared up. The patient, who had been totally disabled before operation by her pains, resumed part of her work after some months, and two years after operation she was fully able to work.

Jelke concludes from the result of the operation that in this case, as in the majority of cases of osteitis fibrosa generalisata, primary hyperparathyroidism caused the condition. Heinrich Lamm, M.D.

Arnold, W.: Parathyroid Tumor with General Calcinosis (Epithelkoerperchentumor mit allgemeiner Calcinose). *Arch. f. path. Anat.*, 1940, 306: 427.

A man of forty years of age was taken ill with severe gastric symptoms (constant pain, inability to eat, frequent vomiting) and signs of cardiac insufficiency (irregular heart action, muffled heart sounds, cold hands and feet). His general condition grew rapidly worse. The blood sedimentation rate was slightly accelerated; there were abundant urinary albumin, leucocytes, and granular casts, but no anemia. In spite of the administration of strophanthin the patient died of heart failure.

Autopsy revealed old pulmonary tuberculosis, chronic nephritis, a tumor of the right parathyroid and hypertrophy of the left parathyroid, and generalized fibrous osteitis with extensive calcium metastases, especially in the myocardium. There were also thromboses in several veins, including the portal branches, with Zahn infarcts through the open foramen ovale into the larger and smaller renal arteries, a duodenal ulcer, necrosis of the pancreas, and numerous small fatty necroses. The picture of acute hyperparathyroidism was present but there had been no clinical symptoms of bone disease.

The histological findings are described in detail with emphasis on the peculiar nuclear changes, particularly in the parathyroids, which were interpreted as calcium deposits, and on the presence of oxyphile cells in the infarcts in the parathyroids, which supported the theory that these cells were inactive.

After discussing the various theories as to the pathogenesis of generalized fibrous osteitis, the

course of the case here reported is presented. Apparently the pulmonary tuberculosis and nephritis, which may cause changes in the calcium metabolism, led to a hyperplasia of the less adaptable left parathyroid gland and the development of the adenoma in the displaced rudiments of the right parathyroid gland. The result was development of fibrous osteitis and calcium metastases. Calcium deposition in the gastro-intestinal mucosa led to the development of a duodenal ulcer, which gave rise to the first clinical symptoms. The further course was characterized by severe injury to the heart from the calcium deposits, and apparently also from the toxic action of the parathormone and the high blood calcium. As the lethal dose of strophanthin is lowered on administration of parathormone and calcium salts, there was also the possibility of an exacerbation of the patient's condition due to the strophanthin medication. The Mandl operation if performed at the time of the first appearance of the symptoms might have saved the life of the patient, although the sudden fall in the blood calcium after removal of the parathyroids might have been dangerous; however, the administration of parathormone probably would have prevented this risk. The atypical course of the disease in this case rendered the diagnosis most difficult, as the symptoms pointed only to the gastro-intestinal tract, and operation was therefore not performed in time.

(A. Beyer). Edith Schanche Moore.

Swinburne, G.: Chronic Laryngeal and Tracheal Stenoses. *Australian & New Zealand J. Surg.*, 1941, 10: 282.

On the basis of his experience, a study of the literature, and the knowledge gained by discussing difficulties with others who have had experience, Swinburne believes that for tracheal and laryngotracheal (that is, subglottic) stenosis which cannot be treated by dilatation and Jackson's decannulation by the corking method, Schmiegelow's method, combined with a thin skin graft, is probably the best and the least time-consuming treatment both for the patient and the surgeon. For gross laryngeal stenosis without a severe degree of collapse due to loss of the cartilaginous framework, the laryngostomy method is probably the surer; but, because of the extra time and the greater amount of attention necessary with the open method, there is no reason why, if the surgeon thinks there is a reasonable chance of success, Schmiegelow's method with skin grafting should not be tried first. Or, if there is a lumen, though small, Jackson's rubber-core mold treatment could be given a trial with very little inconvenience to the patient. This point will be decided after the careful preliminary summing up of the case. It would seem that the method of skin grafting should be considered more often than it has been in the past. In the future, no doubt, skin grafting will be used in some form in every case.

Patients with chronic laryngeal stenosis and wearing a cannula, or with a laryngostomy opening must understand the nature of their condition, and they must never be immersed in water accidentally or while swimming. The whisper is never lost as long as air passes from the lungs up through the mouth. After treatment of the stenosis this whisper increases in strength until a rough voice is developed. As time passes, the voice improves as some sort of adventitious cord develops. If the mobility of the parts of the larynx is retained, new cords, practically indistinguishable from the original cords, develop from the pull of the vocal process of the arytenoids. Some patients get a good deeply pitched voice by phonating with the ventricular bands. The functions of the larynx—phonatory, protective, respiratory and tussive—are all restored in most cases.

Noah D. Fabricant, M.D.

Wilson, G. E.: The Diagnosis and Treatment of Tuberculosis of the Larynx and Contiguous Areas. *Arch. Otolaryngol.*, 1941, 33: 145.

In this article there is a discussion of tuberculous lesions of the mouth, pharynx, middle ear, trachea, and bronchi, as well as of the larynx. Wilson endeavors to review present-day diagnostic measures and methods of treatment of tuberculosis of the larynx and adjacent areas without attempting to invade the field of the specialist in pulmonary diseases or that of the thoracic surgeon.

The conclusions are based on impressions drawn from the author's more than twenty years of experience in the treatment of tuberculosis—seventeen years in private practice and three early years in institutions. The bulk of the work has been laryngeal.

The author believes that worthy progress is being made in the attack on laryngeal, oral, aural, and tracheobronchial tuberculosis.

Noah D. Fabricant, M.D.

Peck, W. S., Maxwell, J. H., and Lamberson, F.: Carcinoma of the Larynx. A Review of 170 Consecutive Cases. *Laryngoscope*, 1941, 51: 97.

This report is based upon the study of 170 consecutive cases of laryngeal and hypopharyngeal carcinomas diagnosed in the University Hospital, Ann Arbor, Michigan, during the last twelve years. Only those patients shown to have carcinoma on histological examination were included in this series. There were 140 males (82 per cent) and 30 females (18 per cent). The youngest patient was twenty-seven years of age and the oldest seventy-nine years of age. The duration of the disease before admission to the hospital is indicated by the duration of symptoms referable to the neoplasm.

In 98 patients the symptoms had been present from six to twelve months, and in 57 others for one year or more. The malignancy was apparently confined to the vocal cords (intrinsic) in 48 patients. In 27 others, the primary involvement was apparently intrinsic but had extended beyond the interior of the larynx. Twenty-eight patients had purely extrinsic lesions; 60 had such large lesions that the primary lesion could not be distinguished, and 7 others had

lesions of hypopharyngeal origin. Practically all of the patients with intrinsic lesions were treated by surgical measures, the small extrinsic lesions were treated by irradiation, and the advanced lesions by both methods or not at all.

The decision regarding the choice between surgical excision and irradiation of laryngeal carcinoma rests largely upon the anatomical location, the extent, and the clinical behavior of the lesion. The small lesion is not necessarily an early one. Although the size of the cancer and the surface area covered by it are important, the depth of infiltration, the rate of advancement, and the degree of anaplasia are factors of real significance in choosing the treatment.

Surgical treatment of laryngeal carcinomas must be limited for the most part to those lesions which are confined to the vocal cords. The present practice is to use irradiation on all patients with extrinsic laryngeal carcinomas. Although it is believed that purely intrinsic carcinomas are best treated by surgical measures, a few patients with the more advanced lesions, which a few years ago would have been subjected to radical surgical procedures, have been irradiated. The excellent results which were obtained in some of these cases have led to the belief that if there is a real doubt regarding the pure intrinsic nature of the lesion, irradiation rather than surgery should be employed.

The results of surgical treatment in this series tend to confirm the opinion that surgical removal of intrinsic lesions should produce a relatively high percentage of cures. Both hemi-laryngectomy and total laryngectomy have produced cures in selected cases. The hemi-laryngectomy is the operation of choice in cases in which it is applicable. Total laryngectomy done upon patients in this series with advanced extrinsic involvement has not produced cures except in 1 instance.

An analysis of the advanced intrinsic and moderately advanced extrinsic lesions treated by irradiation with total doses of 4,000 roentgens or more shows that 8 of 19 patients were living without evidence of cancer at the time of summary more than two years after treatment. This finding is definitely encouraging because most of these patients were considered inoperable when first examined. Four of 35 patients treated have survived longer than from one-half year to two years. The prognosis is, of course, very poor in this group and marked palliation as the result of treatment was rare.

A summary of the treatment shows that most of the intrinsic lesions were treated with surgical measures, which have produced quite satisfactory results to date. Most of the advanced intrinsic and moderately advanced extrinsic lesions were treated by irradiation, also with quite satisfactory results for this type of lesion. In the far advanced lesions both methods were used and in only a few instances did the treatment seem to prolong life.

NOAH D. FABRICANT, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Zuelch: Morphological Findings in Cases of Swelling of the Brain (Morphologische Befunde bei Hirnschwellung). *Zentralbl. f. Neurochir.*, 1940, 5: 166.

This article comprises a report on studies, which, because of the war, have not as yet been completed. In this communication the pictures present in edema of the brain and in swelling are differentiated, and their participation in the pathological enlargement of the brain is determined, and the development of the one or the other of the changes or the mutual time relationship of their appearance in injuries, abscesses, tumors is discussed. This could be done completely only following a thorough study of a huge histological material; however, at this time a few facts which are of importance under war conditions may be reported.

At autopsy colloid swelling of the brain can usually be distinguished from cerebral edema from the fact that in cases of edema water drips from the cut surface and the hemorrhagic puncta are obscured, while in colloid swelling the surface is sticky and the hemorrhagic puncta remain. The difference between the two conditions physically rests in the fact that in edema the intercellular spaces are dilated and filled with fluid, while in cases of colloid swelling the fluids are taken up by some of the colloids and then assume an altered colloid state.

Sphingomyelin is one of the most markedly hydrophile colloids, and since it is present chiefly in the oligodendroglia and in the medullary sheaths, the cortex in cases of colloid swelling suffers less alteration than the medulla, which appears to be markedly widened. Histologically, there is found in these regions a marked state of swelling of the medullary sheaths, and, in advanced cases, a dissolution of the oligodendroglia cells, which exhibit merely increase in size and vacuolization in the initial stages. These changes were found in every case and are beautifully illustrated by photomicrographs in the original article.

The author attempts an explanation of these changes:

He states that the limits existing between the blood and the brain tissue lie either within the endothelium or on its outer wall, where the suction feet of the astroglia lie. These limits are disturbed in their work either hemodynamically or toxically. In the first case the vessels are mechanically overstretched by stasis so that an extravasation of fluids into the tissues (cerebral edema) occurs. The processes concerned in cases of toxic colloid swelling of the brain must still be explained; perhaps they begin as an injury to the astroglia. At any rate there develops not only an extravasation of fluids into the intercellular spaces, but also a colloid swelling of the various tissue constituents. Perhaps similar processes are at work in the cases of brain injury. A complete clarification of these processes must await further studies.

(A. Beyer). John W. Brennan, M.D.

Scherer, H. J.: Cerebral Astrocytomas and Their Derivatives. *Am. J. Cancer*, 1940, 40: 159.

Scherer casts doubt on some of the present theories concerning the biological activity, manner of dedifferentiation, and derivatives of cerebral astrocytomas. In a study of 125 gliomas, 94 were tumors of the cerebrum. Of these, only 18 were astrocytomatous, and but 5 of these 18 were so-called "pure" astrocytomas. The percentage of astrocytomas among the gliomas, therefore, was lower than that which is customarily reported. In 4 of the cases, complete histological examination of the entire tumor revealed discrete, isolated areas of glioblastoma; in 4 others the glioblastomatous areas were so frankly such that they were recognized microscopically. In 5 cases there was a diffuse transition of the astrocytoma into glioblastoma, and in the remaining 3 cases the primary astrocytic character of the tumor was doubtful.

The author recognizes the fibrillary and protoplasmic astrocytes but ascribes no characteristic malignancy to either type. There is also a third, or gemistocytic astrocytoma, the cells of which show excentric nuclei in blobs of pale cytoplasm, with no fibrils, in contrast to the ordinary "naked," fibrillary astrocytic cell. The author believes that Penfield's "piloid" astrocytoma is the same as the spongioblastoma polare of other authors. He determines the cellularity of a tumor by counting the cells per square 0.1 mm., and shows that an apparently highly cellular tumor may only appear to be such because the cells, being larger than in some other tumors, are more closely packed, but they are not actually present in greater than ordinary number. So long as an astrocytoma remains a "pure" growth it will never show necrosis, but when it begins to undergo glioblastomatous proliferation one may expect to find areas of tissue breakdown. So-called "gangliogliomas" are simply astrocytomas in which there remain preserved the original, though altered, cortical ganglion cells; this feature of persistence of normal tissue within an astrocytoma is not uncommon. The author believes that the reason for the dedifferentiation which occurs in some tumors and not in others is not yet forthcoming. He points out that it is probable that the glioblastomas of long clinical history are probably those which originated as astrocytomas and dedifferentiated to a high degree. Operative intervention and partial removal of an astrocytoma can never cause a glioblastomatous change to occur, for the cause of such a change in

cellular characteristics is intrinsic within the cell itself, free of such outside influence.

The principal characteristics of the astrocytoma group of tumors are: diffuse character of growth; enormous size; moderate and uniform cellularity; uniformly amorphous character in the "pure" forms; astrocytic character of the cells in a high but variable percentage; preservation of pre-existent nervous parenchyma within the tumor itself; a tendency to microcystic degeneration of a type specific for astrocytomas; absence of necrosis; low vascularity; and a slow clinical course. JOHN MARTIN, M.D.

Jentzer, A., and Junet, W.: Surgery of the Hypophysis (Chirurgie de l'hypophyse). *Schweiz. med. Wchnschr.*, 1940, 2: 1057.

The authors report in detail concerning 4 cases of tumor of the hypophysis and 4 cases of hypophyseal tumor and/or craniopharyngioma which were operated upon by them.

The first case was an eosinophil hypophyseal adenoma in a forty-five-year-old woman with acromegaly. The patient had had headaches since 1920 and since October 1921 had experienced an increase in size of her hands, feet, and tongue. In November, 1921, she suddenly developed a scotoma in the right eye, and in August, 1922, she presented bilateral atrophy of the optic nerve. Upon admission to the hospital typical acromegaly and bitemporal hemianopsia with bilateral vision of 1/10 and widening of the sella turcica were found. Following x-ray irradiation there was temporary improvement in vision. In February, 1923, there were exacerbation of the headaches, almost complete blindness, and increase in the acromegaly. On March 28, 1923, bilateral decompression trepanation was done with immediate improvement of the headaches and vision. On March 6, 1924, a transnasal operation was done according to the method of Segura. Upon discharge from the hospital twelve days later, the visual fields were again normal. Vision was O.D. ½, O.S. ⅓, and the hands and feet were becoming normal again. After one year the menses again reappeared. The patient was well for three years. In July, 1928, there appeared polydipsia, polyuria (up to 14 liters in twenty-four hours), glycosuria, and loss of weight, and later acetone appeared in the urine. Following the administration of insulin, the urinary output diminished to 1,500 c.cm., and the sugar and acetone disappeared. There was a gain in weight. Failure to observe the dietary regime resulted in return of the polyuria, glycosuria, and acetonemia. On May 29, 1930 the patient died in diabetic coma.

A woman born in 1875 had headaches since 1928 and diminution in vision beginning in 1930. An ophthalmologist made a diagnosis of tumor of the hypophysis. Hemianopsia was present. X-ray irradiation resulted in no improvement. There was an increase in size of the nose, lips, hands, and feet. In February, 1932, a two-stage hypophysectomy was done but total extirpation was not possible. The skull defects were closed with platinum plates. After three days the patient was again able to recognize colors. The visual fields improved. Following operation there was a transitory pachymeningitis and the visual fields again became worse. Since 1937 there had been an increasing polydipsia and glycosuria due to recurrence of the tumor.

The third case was that of a forty-one-year-old woman. Following marriage she had a gain in weight from 73 to 102 kgm. and presented generalized acromegalic transformation. She was childless. Beginning October, 1935, she became amenorrheic and since May, 1935, she experienced a diminution in vision and suffered from headaches. She was admitted to the hospital on April 29, 1936. The visual fields were narrowed and bitemporal hemianopsia was noted. The sella turcica was markedly widened. The patient had disturbances in sleep with polyuria, anosmia, and optical atrophy. A diagnosis of chromophobic adenoma or meningioma of the sella region was made. On May 14, 1936, a total extirpation was done through a frontal approach and drainage was instituted. A walnut-sized, cystic hypophyseal tumor which caused stretching and upward displacement of the chiasm was found. Puncture of the cyst, excochleation, and total removal of the capsule were done. Histologically, an eosinophil adenoma of the hypophysis was revealed. Postoperatively, the hemianopsia disappeared, the visual fields became normal, the sense of smell returned, the headaches disappeared, and the feet became smaller. The menses reappeared.

On February 24, 1934, a branch of a tree fell on the head of a forty-year-old man; he had no loss of consciousness. One month later there was temporal papillary blanching, with a sector-shaped visual field narrowing in the left temporal portion. In June, 1937, there was total optical atrophy bilaterally, bitemporal hemianopsia, adiposity, impotence, and increase in the size of the sella. X-ray irradiation yielded no improvement, but after total extirpation of the tumor through a frontal approach and drainage the wound healed. The histological examination revealed an adenoma resembling the eosinophil type. On the right side the vision returned up to 5/20, in the left eye blindness persisted.

A nine-year-old child fell upon its forehead, following which a strabismus convergens developed. Four weeks later the child became totally blind. X-ray examination revealed intracranial increased pressure and pseudo-intrasellar calcification. The blood pressure was 70. A posterior trepanation gave negative results. The patient expired. Autopsy revealed a calcified cyst of Rathke's pouch.

The sixth case was that of a fifty-five year-old woman. She had had buzzing in her ears of eight years' duration. In December, 1933, she had visual hallucinations and spots before her eyes. On February 26 and 27, 1934, she was in coma and was admitted to the hospital. Converging strabismus on the left side, central facial palsy, and paralysis of the

abducens muscle on the left side were found. There was also foot clonus, frontal headache, and disorientation. A tentative diagnosis of tumor of the frontotemporal region was made. Ventriculography (1,300 c.cm.) revealed marked dilatation of the ventricles—the lateral horns were displaced toward the third ventricle. Following this, there was marked coma. The patient expired. Autopsy revealed a craniopharyngioma.

A forty-two-year-old woman was admitted to the hospital on November 11, 1937. For the preceding two years she had had disturbances of vision, frontal headaches, and urinary incontinence. Vision was O.S. ¼ and there was right homonomous hemianopsia with increased reflexes on the left side and adiadochocinesia. On August 15, 1937, right hemiparesis developed. The ventriculography was indicative of a parietotemporal tumor of the left side. The first operation on September 17, 1939, had to be discontinued on account of secondary suppuration. Following this, the patient developed tachycardia, dizziness, and an uncontrollable cough, and the paralysis of the arms rapidly disappeared. On November 20, 1937, a second operation was undertaken. About nine-tenths of the large tumor of the craniopharyngeal canal was removed. The patient immediately felt better. On November 23 the patient died of an acute meningococcic meningitis.

The last case was that of a sixteen-year-old girl. Since September, 1936, she had had amenorrhea, diplopia, headaches, and vomiting. Vision had decreased rapidly. On October 13, 1936, she had bilateral optical atrophy and blindness in the left eye. The sella was somewhat increased in size. The patient showed personality changes, having become melancholy, and bitemporal hemianopsia. The tentative diagnosis was intrasellar basophil hypophyseal tumor. Operation on October 29, 1936, showed a cystic tumor with upward displacement of the chiasm. Puncture and total extirpation were done. Histological examination revealed a tumor of the craniopharyngeal canal. Cure resulted.

The transnasal approach permits only partial removal of the hypophysis. For this reason there are many recurrences. This approach cannot be employed for suprasellar tumors. The exposure of the hypophysis by means of a frontal skin and bone flap running through the hair line, with its base formed by the lower border, gives a good approach and an invisible scar. The postoperative mortality following this procedure is almost zero. In order to prevent recurrence, the tumor must be thoroughly extirpated. Following this, the prognosis in hypophyseal adenomas is good, but in cases of tumor of the craniopharyngeal canal, the prognosis is poorer. In tumors of the craniopharyngeal canal the pressure upon the chiasm is much greater. For this reason the operation is much more urgent. Operations should be performed as soon as the visual power diminishes. X-ray irradiation is indicated only so long as the visual power remains unaltered. Whereas the symptomatology in cases of hypophyseal adenoma (bitemporal hemianopsia, diminution of vision, amenorrhea, acromegaly, headaches, increase in size of the sella, and a minimum of neurological symptoms) is sharply circumscribed, in cases of craniopharyngeal canal tumors, the symptoms of dizziness, retropulsion, hypotonia, adiadochocinesia, buzzing in the ears, the Babinski sign, hemoplegia, facial paresis, hyperreflex, dysarthria, disorientation, disturbances of memory, and urinary incontinence stand in the foreground. Experimental hyperglycemia and insulin tolerance give normal curves in craniopharyngeal-canal tumors, whereas in eosinophil adenomas the curves appear to be altered.

(Tobler). Harry A. Salzmann, M.D.

Westman, A., and Jacobsohn, D.: Endocrine Studies in Rabbits Following Section of the Hypophyseal Stalk (Endokrinologische Untersuchungen an Kaninchen mit durchtrenntem Hypophysenstiel). *Acta obst. et gynec. Scand.*, 1940, 20: 392.

This article is a second report by the authors on the study of the function of the anterior pituitary lobe in rats and rabbits, this investigation dealing primarily with rabbits.

The animals were operated upon by means of a subtemporal approach to the pituitary gland. The stalk was gently avulsed with a small hook with a minimum of operative trauma. The animals were then observed for from two to ten months, and were studied for histological changes in the anterior lobe as well as for physiological changes such as the altered production of gonadotropic hormones.

The pituitary gland itself showed a marked atrophy, with a reduction of cellular mass and a disappearance of the eosinophilic cells. The ovaries atrophied, losing as much as one-half of their normal weight, but a few ripening follicles remained. The interstitial cells were also reduced in number, and there was atrophy of the uterus. The apparently non-functioning follicles would react only after the administration of relatively massive doses of chorionic hormone. In the male animals the testes atrophied and spermatogenesis ceased. These changes in both sexes were most marked when the pituitary stalk was sectioned before puberty.

If the females were pregnant when operated upon, they would show a degeneration of the corpora lutea, abort, and die, much after the same pattern as a completely hypophysectomized pregnant animal. Ovulation would not occur if the stalk was sectioned before coitus, and any newly formed corpora lutea would degenerate five or six days after operation.

The fact that the carbohydrate metabolism is disturbed in such animals is shown by the fact that even with normal blood-sugar curves, an animal starved twenty-four hours would show the same insulin sensitivity as a fully hypophysectomized animal.

The authors believe that their results support the theory that nervous control mediated by fibers passing from the hypothalamus to the pituitary gland

through the stalk of the gland is the mechanism of importance in the normal function of the anterior lobe of the pituitary gland. JOHN MARTIN, M.D.

SPINAL CORD AND ITS COVERINGS

Krayenbuehl, H.: Diagnosis and Therapy of Chronic Compression of the Spinal Cord with Special Emphasis on Tumors of the Cord (Diagnose und Therapie der chronischen Rueckenmarkskompression unter besonderer Beruecksichtigung des Rueckenmarkstumors). *Schweiz. med. Wchnschr.*, 1940, 2: 1049.

On the basis of 21 cases of chronic compression of the spinal cord observed in the past two years, the diagnosis and therapy of this condition are discussed. According to van Wagenen and Rossier, tumor of the spinal cord develops in 1 of every 3,000 to 10,000 persons. More than three-quarters of these tumors are located extra-medullarly, and of these two-thirds are intradural and one-third extradural. Of the intradural tumors, two-thirds are situated dorsally or dorsolaterally and one-third ventrally or ventrolaterally. When the tumor is located in the dorsolumbar region, the clinical picture is that of a slowly increasing paraplegia; when located at the cervical level it is that of a slowly increasing spastic tetraplegia.

In typical cases the disease picture develops in three stages: The first period is that of more or less severe paroxysmal root-pains; the second period is that of weakness of the legs with disturbances of sensation; and the third period is that of spastic paraplegia. The root-pains are of diagnostic importance; they often occur in paroxysmal attacks and frequently with disturbances of sensation (hyperesthesia, hyperalgesia, later anesthesia). Frequently, in fact, these symptoms precede by a long interval the manifestations of compression. Paresthesias also occur as a posterior root symptom. Anterior root-symptoms are localized muscular atrophies, pareses, and reflex disturbances. Distant motor symptoms are paralyses, especially of the arm extensors and the leg flexors, later disturbances of the muscle tonus (spastic extension and, later, flexion paraplegia, the latter with a poor prognosis), and increased reflexes. Later, distant disturbances of sensation (disturbance of the posture, and of the vibration senses; later, disturbances of pain and temperature perception, and, lastly, disturbances of the tactile perception), and disturbances of the visceral innervation (of the bladder and colon, and pertaining to the secretion of sweat) occur.

Further diagnostic assistance may be gained from a roentgen study of the spinal column for the differentiation of tumors from tuberculous spondylitis, spondylitis deformans, and the osteitis deformans of Paget; from a study of the spinal fluid (physical and chemical) as frequently differences in pressure and differences in the protein content above and below the lesion are valuable; and from myelography which serves to determine the exact level of the lesion. On occasion fluoroscopy on the adjustable table is used.

A chronic compression of the spinal cord develops with extrameningeal processes because of disease of the spinal column in the form of tuberculous spondylitis, primary and secondary tumors, spondylitis deformans, or osteitis deformans of Paget; or because of other diseases such as parasitic cysts, lymphogranuloma, leucemia, tumors, abscesses; with meningeal or intrameningeal processes due to tumors (extramedullary tumors with extradural meningiomas —neurofibroma, hemangioma—and intradural sarcomas; intramedullary tumors in cases of ependymoma, dermoid conglomerate tubercle or chronic meningitis—pachymeningitis, idiopathic and posttraumatic meningitis serosa circumscripta s. arachnitis spinalis).

Therapeutically, in cases of tumor only, laminectomy with radical extirpation comes into question. Of the 21 tabulated cases of chronic compression of the spinal cord collected by the author, there were tumors (6 meningiomas, 3 neurofibromas, 2 lipohemangiomas, and 1 each of melanosarcoma, glioma, ependymoma, lymphangioma, dermoid, and 2 cases which were not determined histologically), a case of tuberculous spondylitis with pachymeningitis, and a case with negative findings at operation. The immediate operative mortality consisted of 2 cases (10.5 per cent); 3 patients died later of pulmonary complications and marasmus. Three cases were operated upon under local anesthesia; the others received intratracheal laughing gas-oxygen-ether-mixed narcosis. (TOBLER). JOHN W. BRENNAN, M.D.

PERIPHERAL NERVES

Girardi, V. C.: Neurodocitis of the Ulnar Nerve in the Elbow Region. (Neurodocitis del nervio cubital en el codo). *Rev. de ortop. y traumatol.*, 1940, 10: 15.

Neurodocitis of the ulnar nerve constitutes a well-defined clinical entity and derives its name from the word "dekon," i.e., "contain." In other words, the term applies to an inflammatory process of the portion of the nerve within the osseous trough formed by the olecranon and the epitrochlea. The nerve is easily vulnerable in this location and the resulting sequelæ produce characteristic symptoms. The condition is more frequent in men than in women and occurs at various ages. The onset is usually insidious; for instance, in patients with a cubitus valgus the first symptoms may appear from five to ten years after the development of the deformity. As to the pathogenesis, the following conditions may be mentioned: post-traumatic cubitus valgus, pseudoarthrosis of the epitrochlea, intra-articular osteocartilaginous formations, deforming arthritis of the elbow, fibrous periarthritis, osteogenic exostosis, ankylosing arthritis, and fracture of the epitrochlea.

The symptoms may be of a motor or sensory character: for example, paresthesias, trophic disturbances, weakness of the adductor muscle of the thumb, or atrophy of the interosseous muscles.

The presence or absence of the reaction of degeneration indicates the gravity of the lesion.

Clinical and roentgenographic studies reveal the type of osseous lesion. The differential diagnosis should consider recurrent dislocation of the ulnar nerve and leprous neuritis.

The treatment is exclusively surgical and offers a choice of four methods: (1) simple liberation of the nerve or so-called neurolysis; (2) widening of the gutter formed by the olecranon and the epitrochlea; (3) supracondylar osteotomy; or (4) transposition of the nerve. The author favors the anterior transposition of the nerve, which gave him very satisfactory results in 9 cases described in detail.

JOSEPH K. NARAT, M.D.

MISCELLANEOUS

Grant, F. C.: Surgical Methods for the Relief of Pain. *J. Am. M. Ass.*, 1941, 116: 567.

The decision to attempt relief of pain by blocking afferent pathways must rest on a number of factors: the position and rapidity of growth of the cancer; the probable period of life expectancy; the amount and location of the pain, the patient's reaction to it, and the dosage of opium necessary for its control; and the patient's general condition as an operative risk. If the lungs are involved or if the life expectancy is less than three months, block by the injection of alcohol into the subarachnoid space or further recourse to morphine is indicated.

The author presents findings on what can be done for relief of pain by interruption of the sensory pathways, the hazards involved, and what justification exists for suggesting these procedures. Three groups of patients have been selected: those with pain in the face and neck due to cancer of the face, jaw, mouth, and sinuses; those with pain in the arm from mammary cancer or axillary or supraclavicular metastases involving the brachial plexus; and a group with abdominal or pelvic disease producing pain anywhere below the ensiform process.

In the first group, cancer situated within the sensory area supplied by the second division of the fifth cranial nerve was most successfully handled. Results are best presented by the following table:

TABLE I.—RESULTS OF SURGERY IN CANCER OF THE FACE, MOUTH, AND NECK—121 CASES, 157 PROCEDURES.

	No. of cases
Alcohol injection in second and third cranial nerves; second or third division of fifth nerve	108
Pain relieved	53 (50%)
Pain partially relieved	17 (15%)
Pain not relieved	38 (35%)
Operations on fifth and/or ninth nerve and/or cervical rhizotomy	49
Pain relieved	32 (80%)
Pain partially relieved	5 (12.5%)
Pain not relieved	3 (7.5%)
Died	9 (18%)

Cancer of the breast with metastatic spread into the brachial plexus is included in the second group. High chordotomy at the third cervical segment has been done three times, but only once with satisfactory relief of pain. This is the operation of choice because the sense of touch and position in the arm and hand is spared and its usefulness unimpaired. Rhizotomy of the posterior spinal roots from the third cervical to the second thoracic segment is considered the operation to be recommended. It necessitates a wide laminectomy of 7 vertebræ and the section of 8 posterior nerve roots. This is essential for complete relief of pain. As soon as the patient is up and around, the arm should be supported in a sling. In this series 15 cervicothoracic rhizotomies have been performed. In 8 cases pain was entirely relieved; in 5, pain recurred because of the upward spread of the growth; 2 patients died.

Pain due to malignant disease referred to any area below the ensiform process is most effectively relieved by unilateral or bilateral section of the anterolateral columns of the spinal cord (chordotomy). This is thought to be an ideal operation when the incision is limited solely to the anterolateral columns of the spinal cord. Hazards are the possibility of motor weakness in the legs, incomplete relief of pain, and damage to sphincter control. Precautions to avoid such results must be taken. Grant advises unilateral chordotomy with repetition of the procedure on the opposite side if minor contralateral pain previously unnoticed by the patient reaches major proportions.

At present the author performs a unilateral laminectomy of the second and third thoracic vertebræ. For bilateral chordotomy the first to the fourth spines and laminas are removed and sections are made at the second thoracic segment on one side and the fourth on the other. Unilateral chordotomy has only rarely produced loss of sphincter control. In most instances control is rapidly regained.

In the reported series there were 54 bilateral and 55 unilateral chordotomies. Sixty-eight of the patients obtained complete relief, 16 experienced relief estimated at 75 per cent, 9 had only 50 per cent relief, 4 received no relief, and 12 died (11 per cent mortality).

The injection of absolute alcohol into the subarachnoid space has been performed one or more times on 31 patients. In 15 cases relief of pain was satisfactory and in 6 it was partial; 10 injections were entirely unsatisfactory. In 1 patient a partial weakness of one leg developed and persisted for about a year. A second patient had partial paralysis of both legs and complete relaxation of the sphincters; pain was unaffected.

EARL GARSIDE, M.D.

Hausman, L.: Surgical Treatment of Syphilitic Optic Atrophy. *Am. J. Ophth.*, 1941, 24: 119.

Cases manifesting the syndrome of syphilitic chiasmal arachnoiditis have hitherto been diagnosed as tabetic optic atrophy. That cases of syphilitic primary optic atrophy (due to parenchymatous disease of the optic nerve) exist is not to be underestimated, but in view of our new experience the

outlook upon the pathogenesis of syphilitic optic atrophy should be broadened. The point to be emphasized at present is that adhesions may exist at the base of the brain in cases of syphilitic primary optic atrophy, with or without signs of tabes dorsalis in the spinal cord.

Certain signs are helpful in arriving at the diagnosis of syphilitic chiasmal arachnoiditis. When patients with syphilis and primary optic atrophy present heteronymous visual-field defects or multiple cranial-nerve lesions adjacent to the optic nerve, or when primary optic atrophy and syphilis are the only signs present, adhesions at the base of the brain in the region of the chiasm should be suspected. Visual-field studies should be made early and frequently so that in the future we may know more precisely the different types of field defects that may be present in such cases.

Whether perimetric studies will disclose other defects as helpful as the heteronymous defects in localizing the site of the lesion at the chiasm remains to be determined. Whether they will likewise prove helpful diagnostically in establishing the presence of optic adhesions remains to be seen. However, even when the visual-field studies are not conclusive for diagnosis, the possible existence of adhesions around the optic chiasm and nerves should be kept in mind. This is important for therapeutic reasons, for once adequate anti-syphilitic treatment in a case of syphilitic primary optic atrophy fails to arrest the progress of visual impairment so that blindness threatens, the patient should be acquainted with the prospects of surgical intervention. At this stage of management, even severe optic atrophy is no contraindication to surgery. When blindness is imminent, no reasonable measure should be ignored.

Although the present series of cases is too small to warrant final conclusions, the results obtained thus far in the treatment of syphilitic optic atrophy due to adhesions justified the surgical approach. There was no mortality, and all patients did well after the operation. LESLIE L. MCCOY, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Hinchey, P. R.: Nipple Discharge: A Clinicopathological Study. *Ann. Surg.*, 1941, 113: 341.

Some type of discharge from the nipple occurs in about 8 per cent of all mammary lesions. A sanguineous discharge occurred in 6 per cent of 5,118 patients coming to the Johns Hopkins Hospital because of a breast complaint.

Sixty-seven cases of nipple discharge are reported. The discharge contained blood in 35 instances. Three lesions were responsible for about three-quarters of the cases—carcinoma, chronic cystic mastitis, and papilloma. Papilloma is a precancerous condition. Chronic cystic mastitis, with epithelial hyperplasia, is also to be regarded as precancerous.

Twenty-four women had cancer; 12 of them had a non-sanguineous discharge, and in 11 women discharge was the first warning of any disease in the breast. Four women had no mass in the breast at the time of their first examination. Contrary to common experience, chronic cystic mastitis was encountered more than twice as often as papilloma.

The chief problem is the discharging breast in which no mass is palpable. Such a breast must be suspected of harboring not only the precancerous conditions of a papilloma or chronic cystic mastitis with epithelial hyperplasia, but even an actual cancer.

Treatment consists of local surgery or mastectomy. Radiation therapy has not proved to be of value. A definite number of cases require not operation, but observation. The surgeon, however, should try to make this latter group as small as possible, by consideration of all possible surgical indications. In this manner, important cancer-preventive surgery can be performed and the surgeon will occasionally be rewarded by the discovery of an early, impalpable cancer.

JOSEPH K. NARAT, M.D.

Savarese, E.: A Study of 2 Cases of Tuberculosis of the Breast (Osservazioni sopra due casi di tubercolosi mammaria). *Policlin.*, Rome, 1940, 47: sez. chir., 378.

The author describes 2 cases of tuberculosis of the breast in women fifty-nine and sixty-three years of age, in which operation was performed. Photomicrographs of the histological findings are given. Both patients made an uneventful recovery.

In connection with these cases the author discusses some of the most disputed points in regard to tuberculosis of the breast. In the first place, some authors hold that the breast can be infected directly through the galactophorous ducts, while others believe that the infection is hematogenous, and still others think that it is retrograde through the lymphatics. Probably the hematogenous theory is the one most generally accepted, but in the author's cases there was evidence of lymphatic infection. This may take place not only by retrograde transmission but also by contiguity from progressive tuberculous degeneration of the walls of the lymphatics. Often palpation shows lymphatic cords extending from the axillary glands to the lesions in the breast. In the author's cases the axillary-gland lesions preceded the mammary-gland involvement by three and four months and lymphatic tracts could be demonstrated connecting the two sites.

There is also considerable difference of opinion in regard to the frequency of the disease. Among 476 cases of disease of the breast examined by the author he found only these 2 cases of tuberculosis, which amounted to 0.4 per cent. He thinks, therefore, that it is a very rare disease.

There is difference of opinion also in regard to the predisposing causes of the disease. Some think that it occurs chiefly during the age of sexual activity, but the author's cases in old women who had never been married argues against this theory. Trauma and old infection of the breast are given as predisposing causes but neither of these was present in either of the author's cases.

From the point of view of pathological anatomy there is difference of opinion as to whether the tuberculosis originates inside or outside of the mammary gland. The author's cases argue in favor of a mesodermic origin of the disease.

There is a form of the disease called the sclerolymphatic type in which the resemblance to carcinoma is very close. Differential diagnosis can often be made only by careful histological examination. Enlargement of the axillary glands is an important diagnostic point. In tuberculosis this is generally out of proportion to the breast tumor and is larger and more rapid in development than in cancer; it is of the plastic inflammatory type with a tendency toward early softening and ulceration. Often the patients come for treatment for the gland affection rather than that of the breast. Some authors believe the differentiation between cancer and tumor is not of great importance because both require surgical treatment; this is not true, however, for less radical operation is required in tuberculosis and the prognosis is much less grave. Therefore, every effort should be made to arrive at a differential diagnosis.

AUDREY G. MORGAN, M.D.

Spoto, P.: A Contribution to Our Knowledge of Fibromas and Fibromyomas of the Nipple (Contributo allo studio dei fibromi e fibromiomi del capezzolo). *Clin. ostet.*, 1940, 42: 422.

Fibromas of the nipple are very rare. Spoto briefly mentions one of the relatively more frequent cases of general neurofibromatosis with one small tumor localized on the nipple. He then describes in detail the extremely rare case of a pendulous fibroma of

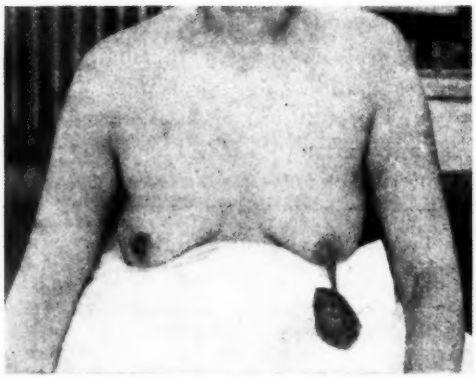

Fig. 1. The author's patient with a solitary pendulous fibroma of the nipple.

the nipple. No more than a dozen of such cases have yet been published.

The patient, an elderly woman, asserted to have noticed a little tumor on the left nipple since her childhood; at the beginning of puberty it had only the volume of a chick-pea. During menstruation it became softer, however, without growing in size, It had reached the size of an almond when the patient went through her only pregnancy at the age of twenty-six years. During the nursing period milk trickled out of that part of the tumor where the stalk was inserted. During the last thirty years the tumor had its present size. The left nipple was apparently substituted by a cylindrical stalk, of the size of a little finger. On this stalk a tumor was suspended: its size was like that of a lemon. It had a knotty surface, was of a grayish color with darker-colored furrows which made it suggest a big mulberry; it was homogeneously hard and fibrous. The tumor was removed and the trunk was sunk.

The tumor weighed 125 gm. The cut clearly showed an outer grayish, festooned portion from 0.5 to 2 mm. thick, and an inner white fibrous portion.

Histologically, the outer portion was covered by a stratified epithelium similar to that on the surface of the nipple. Beams of the same kind of epithelium extended into the underlying stratum of the connective tissue. By division and anastomosis they formed a network containing islands of a different tissue composed of connective and plain muscle fibers. In some regions the muscle fibers showed hyaline degeneration, and the connective tissue appeared to be distended so that it looked almost myxomatous.

The author concluded that the tumor partly underwent regressive processes. There were sporadic gaps in the tissue, coated with an epithelium of prismatic and cubic cells, and supported by a stratum of connective tissue with interspersed smooth muscle fibers which were arranged mostly in a circular shape; these were presumably residua of milk-ducts. The stalk of the tumor was richly provided with blood vessels, part of which showed signs of sclerosis. NELDA CASSUTO.

TRACHEA, LUNGS, AND PLEURA

Jacobaeus, H. C., and Bruce, T.: A Bronchospirometrical Study on the Ability of the Human Lungs to Substitute for One Another. I. Bronchospirometrical Experiments in Which One of the Lungs was Completely Cut Off from Respiration. II. Bronchospirometrical Experiments with Both Lungs Breathing, One Nitrogen and the Other Oxygen, with or without the Administration to One Lung of Carbon Dioxide in Such a Concentration as to Prevent the Giving Off of Carbon Dioxide from the Lung in Question. *Acta med. Scand.*, 1940, 105: 193, 211.

This article which is divided into two parts deals with a bronchospirometric study and experiments to prove the ability of one human lung to take over the function of the other lung. The authors presuppose that readers understand the technique and procedure used in bronchospirometry. They review the history of the study of lung function, this historical information dating back as far as 1892. They also discuss the historical aspects of the use of the bronchospirometer both from an experimental and diagnostic standpoint. After this review they give the results of bronchospirometric experiments in the human being, using different cases to test out the ability of one lung to substitute for the other.

Bronchospirometric experiments with human subjects, in which one lung is made to breathe oxygen and the other nitrogen cause no greater discomfort than ordinary bronchospirometry when both lungs breathe oxygen. Experiments with one lung breathing oxygen and the other nitrogen to which enough carbon dioxide is added to prevent the output of carbon dioxide from the lung cause considerable dyspnea, but not so much that the subjects cannot very well continue with the examination.

The oxygen consumption during both the nitrogen and nitrogen and carbon-dioxide experiments is about as great as in ordinary bronchospirometry. Thus, under these experimental conditions, the oxygen-breathing lung alone answers for as large an oxygen intake as both lungs together in ordinary bronchospirometry. The lack of dyspnea when one lung breathes pure nitrogen shows that the oxygen-breathing lung satisfies the oxygen need by very economical breathing, i.e., it takes up a large amount of oxygen from a small amount of inspired air. The ventilation equivalent for oxygen for the oxygen-breathing lung was also extremely low, 1.03 and 1.16, respectively, in the two experiments. When one lung breathes nitrogen plus carbon dioxide, the dyspnea causes the ventilation equivalent for the oxygen-breathing lung to rise nearer the normal level. When one lung breathes oxygen and the other a gas mixture with a lower oxygen content than atmospheric air, extremely high values for the ventilation equivalent for oxygen are obtained. Thus, one lung given air containing 8.3 per cent oxygen showed the greatly pathological value of 10.49.

When one lung breathes nitrogen or nitrogen plus carbon dioxide, oxygen is given off by this lung until the oxygen tension in its spirometer becomes equal to that in the blood passing through it.

When one lung breathes nitrogen, just as much carbon dioxide is given off from the oxygen-breathing as from the nitrogen-breathing lung. Thus the excretion of carbon dioxide can proceed quite independently of the oxygen intake. When one lung breathes nitrogen or nitrogen plus carbon dioxide, oxygen is given off by this lung until the oxygen tension in its spirometer becomes equal to that in the blood passing through it.

When one lung breathes nitrogen, just as much carbon dioxide is given off from the oxygen-breathing as from the nitrogen-breathing lung. Thus the excretion of carbon dioxide can proceed quite independently of the oxygen intake. When one lung breathes oxygen and the other a mixture of carbon dioxide and nitrogen, the oxygen-breathing lung takes entire care of not only the oxygen intake, but also the carbon-dioxide excretion necessary for the organism, while the other lung is entirely prevented from participating in the respiration. When one lung is prevented from giving off carbon dioxide by the addition of carbon dioxide to the oxygen spirometer, and the other lung breathes pure nitrogen, the latter lung takes care of the necessary carbon-dioxide output alone; the lung breathing oxygen and carbon dioxide acts as a resorption organ by alone and exclusively taking care of the oxygen intake, and the nitrogen-breathing lung functions as an excretory organ by being used solely for the elimination of carbon dioxide.

The oxygen saturation in the arterial blood falls both when one lung breathes nitrogen and nitrogen plus carbon dioxide, because the blood passing through it cannot be arterialized. Fick's formula for calculating the apportionment of the cardiac output to the lungs under these conditions does not give uniform results. In two experiments which can be considered to represent the norm, however, the calculations pointed to an equal distribution of the blood to the two lungs. That the circulation is maintained in a lung breathing nitrogen or nitrogen and carbon dioxide, is evident from the invariable drop in the arterial oxygen saturation and the fact that the nitrogen-breathing lung continues to eliminate carbon dioxide.

The relative values for the minute volume of the heart obtained tonometrically by determinations of the pulse rate and blood pressure indicate that there is no increase in this volume during nitrogen or nitrogen and carbon-dioxide bronchospirometry.

PAUL MERRELL, M.D.

Chandler, F. G., Mason G. A., Livingstone, J. L., Edwards, T., and Others: A Discussion on the Treatment of Traumatic Hemothorax. *Proc. Roy. Soc. Med.*, Lond., 1940, 34: 73.

There surely can be no doubt that the lung itself is frequently the source of hemothorax. As regards absorptive treatment with drugs, there must be few today who would hold it of any value. The exploring needle is essential for diagnosis and for the early detection of infection. It may have to be employed repeatedly. With proper technique it is without danger and should be practically painless.

The value of roentgenography, both in diagnosis and subsequent control of the case, cannot be exaggerated.

The problem of treatment cannot be reduced to a simple formula, for the hemothorax may be: (1) simple and non-infected, (2) infected, or (3) complicated by many other factors.

A simple and non-infected hemothorax, (a) small and probably not requiring treatment, or (b) not small and demanding treatment, would present different characteristics. A small hemothorax would be one with physical signs of fluid only at its extreme base; the skiagram would show fluid in the costophrenic sinus and the dome of the diaphragm would be visible. If the dome was nearly obscured there would be probably half a pint of blood or more.

The infection in a hemothorax would be indicated by bacteriological examination (aerobic or anaerobic), by odor, or by massive clotting. If the blood withdrawn by the exploring syringe had any unpleasant odor, it must be assumed that the hemothorax was infected, no matter what the bacteriological report, and treated accordingly without delay. There should be no waiting for evidence of toxemia. Delay in recognition and treatment by efficient drainage greatly increased the mortality in the last war.

Other complications were: open wound of the thorax; indriven splinters of bone, missiles, clothing; damage to the lung with or without a retained foreign body; pneumothorax, valvular or otherwise; perforation of the diaphragm, and injuries to other parts.

The first essentials of treatment of simple, non-infected hemothorax are rest and the treatment of shock, blood loss, and pain by the usual methods; the relief of cough and dyspnea, and the promotion of sleep.

M & B 693, prontosil, proseptasine, rubiazol, sulfathiazole, and allied chemicals will probably be used in an attempt to limit, control, or prevent infection in the lung and tissues generally.

If the hemothorax is small and uninfected, nothing more need be done; otherwise early aspiration by air or oxygen replacement is advocated. By early is meant within twenty-four or forty-eight hours, unless urgent dyspnea or extreme mediastinal displacement makes even earlier treatment necessary. Aspiration may be indicated in the first few hours or not for days. By the replacement method there is no disturbance of the mediastinum, no encouragement to further bleeding, and no danger. If a considerable amount of blood be left, the sequelæ may be pleural thickening, non-expansion of the lung, and calcification. After replacement, a skiagram of the lung may reveal foreign bodies which before were obscured by the overlying blood.

There is no need today to stress the fact that to aspirate any considerable quantity of fluid without admitting air is dangerous. The slightest discomfort, a feeling of tightness, and cough, are all indications that the pleural pressure is becoming dangerously negative.

After aspiration of all the blood possible, watch must be kept for the re-accumulation of fluid. This may be determined by means of physical signs, or with x-rays, preferably the latter. If there is a re-accumulation, exploratory puncture to determine the nature of the fluid is indicated.

When the patient's condition permits, breathing exercises to restore diaphragmatic movement and basal expansion are an essential part of the after-treatment.

Hoyle stated that during the last war it was found that a traumatic hemothorax which remained sterile had practically no mortality after the first two days. The average period of invalidism for these patients was about three months; 5 per cent left the Services, and the majority of the remainder became fit for duty in less than six months. But infection was common as it occurred in a third of all the patients, and for these the prospect was grim: there was a mortality approaching 50 per cent within a few weeks, with a third of the survivors leaving active service after seven months in the hospital, and a fair number taking a year before returning to duty. Many of these kept the legacy of a collapsed lung and rigid thorax and never became restored to health or to efficiency. Taking all these together with those who died within the first two days from hemorrhage or from tension hemothorax, and those late catastrophes which postwar figures never traced, there is no doubt that the toll of traumatic hemothorax was high.

The importance of the presence of traumatized lung tissue or of a foreign body is so great that it properly forms the basis upon which the treatment of traumatic hemothorax should be considered, as indeed it did among those experienced in the last war. Thus we distinguish simple hemothorax from what, for convenience, is termed compound hemothorax, the latter term implying that the hemothorax is accompanied by important injury to the lung or to the chest wall or by a retained foreign body which is regarded as significant. In the simple form the hemothorax is the chief lesion: it does well with conservative management and operative measures are rarely needed; in the compound form the hemothorax is no more than an incident that happens to occur in a complicated injury, it responds poorly to conservative management, and operative measures are usually advisable.

It is convenient to deal with it under four headings: the early management during the period when shock and the effects of hemothorax or of tension within the pleura are of chief importance, the subsequent management of the simple, and then the compound hemothorax, and the management of the infected hemothorax.

During the first few hours all patients with hemothorax can be grouped together, for the initial shock of the injury has to be controlled, the effects of hemorrhage overcome, and pleural tension relieved. They should be rested in a sitting position if there is any respiratory difficulty, but otherwise, especially if shock is severe, recumbency is better. Morphine is needed for the relief of pain and anxiety, and for securing sleep. Only if there is much associated hemoptysis should morphine be used with caution, for then it may well favor the aspiration of blood into the opposite bronchial tree and lead to collapse of the lower lobe on that side. Morphine, by relieving pain, may actually facilitate cough after a chest injury, and at any rate with a large hemothorax the danger that cough may produce further bleeding is not material.

Transfusion is required for large effusions, especially if they have accumulated rapidly. Blood is preferable to plasma, although in an emergency a transfusion can be started with plasma while the patient is being matched. Quite a large hemothorax can be tolerated without much dyspnea provided that it accumulates slowly, but if there is any evidence of increased intrapleural pressure, blood should be removed by aspiration and replaced with air. The amount of air introduced is less than the amount of blood removed in such cases, and has to be gauged individually.

A simple hemothorax or hemopneumothorax may be found after a small penetrating wound of the chest without at any time having led to noticeable symptoms. It may indeed be found accidentally without any other evidence of a chest injury. Whatever the symptoms or size, a sample of the blood should be obtained to confirm the diagnosis, which is by no means always easy without needling, and also to exclude infection. For this, smears should be made at the time, with a culture report following. It is not accurate to assume that a hemothorax is uninfected because there is no change in color, no laking, or no smell; infection, unless it is a mixed one, does not always produce such changes early.

Apart from the removal of blood for mechanical reasons already mentioned, there are other good reasons why a simple hemothorax should be treated routinely by air replacement. One of the most important is the lengthy time that is required for such effusions to absorb—a process which takes weeks or months if left to nature can be effected in less than an hour by aspiration with air replacement. Again, because infection is so prone to attack the pleura in these patients, it is important not only to remove such an excellent culture medium as blood but also to effect re-expansion of the lung and obliteration of the pleural sac as quickly as is consistent with safety and comfort, and this can be done only with air replacement.

Among the difficulties of air replacement, a dry tap is often due to the choice of too low a site for aspiration, in turn due to the fact that the diaphragm on the affected side is, in these patients, usually

situated at a high level. Another difficulty is that villous tags of fibrin may block any but large cannulæ. If a posterior site is chosen for aspiration, difficulty may be had because of the fact that the end of the cannula comes into contact with the re-expanding lung as fluid is withdrawn; what has been an easy aspiration suddenly becomes one in which any further blood is withdrawn only with the greatest difficulty. This can be remedied by introducing air, when the lung collapses again away from the aspirating needle and the blood once more begins to flow readily.

There are a few examples of simple hemothorax with massive clotting, which forms either a gelatinous mass or a carpet of fibrin and entangled corpuscles. Failure to aspirate a hemothorax after using proper technique should always arouse the suspicion that this state of affairs exists. A massive gelatinous clot gives a roentgenological picture which is in no way distinctive, and with a fibrin clot the appearance is likely to lead to its recognition only if gas is also present, and if a hematoma of the lung can be excluded. A solid hemothorax should be evacuated by open thoracotomy provided that the general condition of the patient permits, for it is a potent source of subsequent ill-health as it absorbs only with much difficulty.

The term "compound hemothorax" includes all those examples of traumatic hemothorax which are accompanied by evidence of serious injury to the lung or chest wall, or by a retained foreign body.

If it seems probable that a considerable laceration of the lung or hematoma is present, thoracotomy is the treatment of choice provided that it is done within about six hours from the time of injury and provided also that shock and the effects of hemorrhage have been controlled sufficiently well to make surgery judicious. The advantages of surgical treatment are that it allows excision of the wounds, provides opportunity of emptying the pleural cavity thoroughly and of arresting hemorrhage, allows the removal of traumatized segments of lung, and also allows healthy lung to be inflated at the end of the operation and the pleural cavity to be drained. The results can be dramatic, and patients who otherwise would pass through many weeks or months of dangerous illness can be rapidly restored to health.

The possibility of infection in a hemothorax must be kept constantly in mind, for it may occur later, up to several weeks after injury. The classical features are not always found, and often the only certain means of diagnosis is the aspirating needle. If organisms are found in smears, treatment should begin at once; it is unwise to wait for confirmation from culture reports as the growth in the chest is at least as rapid as in the media, and delay may mean disaster.

The correct treatment of an infected hemothorax in its early stages is repeated aspiration, as it is for other forms of empyema. It is a mistake to insert a drainage tube until the infection has become localized. The proper re-expansion of the lung is a slow and difficult process in these patients, and if a tube is used too early there is risk not only of collapse of the lung due to the admission of air, but also that loculation of the infection is made more likely and subsequent drainage more difficult. The result is that recovery is slow and hazardous.

Surgeon Commander G. A. MASON states that injuries to the parietes, lung, mediastinum, heart, and abdominal viscera—when the diaphragm is torn—are among the causes of traumatic hemothorax. External wounds and retained foreign bodies may or may not be associated with these injuries.

Unless a large vessel is injured, bleeding in cases of closed hemothorax is apt to cease spontaneously by clotting and as the pressure in the pleural cavity attains equilibrium with that in the bleeding vessel.

If infection does not develop, the hemothorax may be allowed to absorb spontaneously, or aspiration and air replacement may be employed. The latter is usually desirable as it shortens convalescence and facilitates adequate x-ray inspection of the thoracic contents. It is done according to preference from four to six days after the injury, but not earlier than the third lest further bleeding be precipitated, or later than ten days if there is no definite x-ray evidence of commencing absorption.

Routine exploratory operation has been advocated for all penetrating wounds of the chest seen within the first twelve hours—as for similar wounds elsewhere. A major operation should not, however, be undertaken for small, non-sucking wounds, provided there is no progressive hemorrhage and no suggestion of involvement of the abdominal viscera. These small wounds merely require excision and suture under local anesthesia.

Evidence of continued or recurrent bleeding and the supervention of infection are, therefore, indications for exploratory operation. It is also indicated if there is evidence, from the nature of the injury or from the presence of peritonism, of abdominothoracic injury. Early operation is also called for when there are jagged wounds, or evidence, roentgenological or presumptive, of the presence of large foreign bodies or of bronchopleural fistulas. This last complication may be recognized sometimes by the coughing of bloody froth in association with the signs of pneumothorax, and if the latter is of the valvular variety, by severe distress due to the raised tension within the pleural cavity.

Wound edges must be excised and any fragments removed. These wounds may, by suitable traction, permit of a complete exploration of the pleural cavity. If not, they must be closed and a deliberate thoracotomy carried out. This may be done through the standard posterolateral thoracotomy incision along a middle intercostal space, with the patient lying on the opposite side, adequate exposure being obtained by means of expanding retractors. A similar, but not quite such a good exposure, may be obtained by an incision opening into the intercostal space anteriorly. Further exposure may be obtained by dividing the rib or cartilage above or below.

Blood is evacuated from the pleura by suction or, failing that, by means of absorbent pads or sponges, in which case unnecessary scrubbing of the pleura should be avoided. Bleeding points are controlled by forceps and ligation, by diathermy if the vessel is small and if a non-explosive anesthetic is being used, or, if need be, by leaving tampons in position. The dual pulmonary circulation permits of ligature of the main vessels of the lung without fear of necrosis. Lacerations in the lung are repaired, or, if a lobe is badly shattered, it is removed, and the diaphragm and pericardium are inspected for tears which, if present, are opened up and injuries of the viscera beyond them are searched for and dealt with.

If the parietes cannot be closed secundum artem because of extreme damage or because of the general state, then tampons must be arranged to occlude the external wounds and to prevent a sucking pneumothorax. Elastoplast strips are placed across them, to firmly support the chest wall. Some care is needed when working on the right side of the chest lest these packs press unduly against the great veins and interfere with the return of blood to the heart. Such packs will require changing usually in from four to ten days; signs of infection call for early removal.

One of the principal objectives after any thoracic operation or injury is not only to restore maximum functional efficiency of the chest, but also to obtain complete occlusion of the pleural space, by re-expansion of the lung if possible.

LIVINGSTONE: In wards full of septic cases it is wise to do the gas replacement in a side room under full aseptic precautions to minimize the risk of infection. The operation should be done early, in twenty-four hours, before clotting or infection has taken place.

EDWARDS was of the opinion that once the condition of shock had passed, the sooner the blood within the pleural cavity was removed the better.

There was no risk of recurrence of the hemorrhage, if arising from the lung, provided that the blood removed was replaced by the same quantity of air. This could be done with a pneumothorax apparatus, if available, through a second needle puncture or through the same two-way needle as that used for aspiration. After two or three syringes of blood were removed in the latter case a similar quantity of air was injected.

Early aspiration had obvious advantages:

1. It removed the blood before clotting occurred.
2. It removed an excellent culture medium for organisms.
3. When the hemorrhage was the result of damage to the vessels of the chest wall and was continuing, it could be diagnosed early by roentgenological examination or physical signs and before the general signs of hemorrhage were present if gas replacement had been carried out early, as the increase in fluid within the pleura was obviously owing to the presence of the air. When air replacement had not been carried out bleeding might continue without alteration in the physical or roentgenological signs, as the lung gradually collapsed beneath the fluid until general signs of internal hemorrhage appeared.
4. It prevented the late results of pleural fibrosis and chest contraction and the occasional occurrence of encysted collections in the pleura.

With regard to the objection which had been raised to repeated aspiration, that it increased the risk of infection of the chest wall, it must be stated that such infection often resulted when air-tight intercostal drainage was adopted. In any case, the risk of infection of the chest wall could be overcome by a method suggested by the speaker many years ago. This consisted in an incision of the chest wall under local anesthesia down to or even including a portion of rib, but without opening the pleura. Aspiration was carried out through the intercostal space or rib bed, and on its completion the incision was packed with flavine gauze. When further aspiration was required the pack was removed and the needle inserted as before. This had the advantage that the granulation tissue formed around the pack prevented the spread of infection in the chest wall and also permitted painless aspiration without the use of local anesthesia.

THOMPSON stated that the immediate treatment of traumatic hemothorax is essentially the immediate treatment of the injury to the chest and of the general condition of the patient. Every hemothorax is accompanied sooner or later by a serous effusion, so that the fluid in the chest is not pure blood. This is easily shown by estimation of the hemoglobin in the fluid.

Aspiration of blood with air replacement was very generally advocated at this meeting, but Thompson regarded replacement as a purely emergency measure. He says it is done to collapse the lung and prevent further hemorrhage from the lung itself. Once the hemorrhage has ceased it is the aim to obtain re-expansion of the lung as soon as possible, and for this purpose it is necessary to remove the air as soon as it is considered safe. As a general principle it is unwise to introduce air into an infected pleural space before adhesions have developed. It merely produces a total empyema, when by aspirations or by closed intercostal drainage without the admittance of air the empyema space can be limited to a localized posterior pocket, which heals readily with adequate drainage.

BROCK says that in the simple type of hemothorax aspiration is usually satisfactory except when clotting has occurred. Such cases may have to be treated by open evacuation of the clot. Aspiration should be done early although it is usually neither convenient nor kind to submit the patient to it until he has had an opportunity to rest after his trying experience: this usually means eighteen to twenty-four hours after injury.

In the compound variety of hemothorax a major surgical wound which demands operation is usually present, and the hemothorax should be dealt with incidentally at the same time. However, the hemothorax is put so prominently in the clinical picture

that it is often judged to be a leading feature instead of a subsidiary one. The presence of a retained foreign body, particularly a large bomb or shell fragment which by inference has caused more than trivial damage to the lung, is a probable indication for operation: if evidence of a fistula is present, operation is needed. With regard to damage to the chest wall, a fractured comminuted rib suggests the need for surgery, and damage to a costal cartilage should make surgery imperative.

A wound that is big enough to cause sucking will not do so if there is a large hemothorax; but, instead, blood will pour out on movement, coughing, or with respiration and produce a so-called "leaking hemothorax." This condition demands operation and yet it is often treated conservatively: Brock thinks that as the rush of blood is so frightening cool judgment is impaired.

These patients with compound or surgical hemothorax need bold surgery urgently and if so treated within the first few hours will make a rapid, complete recovery. This is in contrast to the patient who has a contaminated wound leading down to an unevacuated large hemothorax with a retained foreign body.

When infection has occurred in a big clotted hemothorax the condition is very difficult to treat. Aspiration fails, intercostal drainage fails, and rib resection, unfortunately, gives a total empyema. The best treatment for this as for compound cases is prophylaxis—it should not be allowed to occur.

JOHN J. MALONEY, M.D.

Colosimo, C.: A Contribution to the Radiological Study of Pulmonary Atelectasis (Contributo allo studio radiologico dell'atelettasia polmonare). *Radiol. med.*, 1940, 27: 601.

When, for any reason, the passage of air from the alveolar spaces is prevented, the residual gases are gradually absorbed until equilibrium is again established between the pressure within the capillaries and that within the alveoli. First in the order of absorption is oxygen, carbon dioxide is next, and nitrogen is last. As the alveolar walls become approximated, desquamation of the epithelial cells occurs, and with the reduction in intra-alveolar pressure goes a hyperemia involving the capillaries. Since the capillaries are distributed as a dense network over the surface of the alveoli and the thickness of the intervascular spaces is determined by the caliber of the vessels, it follows that distention of the vessels results in their compression and hence in transudation of serum into the now collapsed alveoli. Thus, the increased density seen in the roentgenogram is the result not only of the approximation of the alveolar walls, but of hyperemia, edema, epithelial desquamation, and alveolar hemorrhage. Otero and his coworkers have identified a reaction of the connective tissue leading to hepatization.

To this sequence of events compensatory reactions are far-reaching and of great clinical importance. The first of these is an emphysema which may be very extensive; others are a flattening of the involved hemithorax with retraction of the intercostal spaces and an increased obliquity of the ribs, displacement of the mediastinum toward the affected side, and elevation of the diaphragm. Such mechanisms are considered static or passive in contradistinction to the pendular motion of the mediastinum and the paradoxical motion of the diaphragm which may be considered as compensatory measures of function.

The author distinguishes between pulmonary collapse, which results from reduction in the capacity of the thoracic cage, and atelectasis proper, due to retraction of the lung itself. The first situation is commonly caused by pleural effusion, pneumothorax, unilateral tumors, or by congenital or acquired deformities such as scoliosis or thoracoplasty. The latter may be the result of mechanical occlusion of a bronchus, of functional occlusion following bronchial spasm, of angioneurotic edema, or of sympathicovagal imbalance. With respect to the last factor, it is found (Benedetti, Viola, Luisada) that the expansile tone of the lung is under vagal dominance, while the constrictor tone is determined by the sympathetic fibers. It has been further demonstrated that abdominopulmonary reflexes

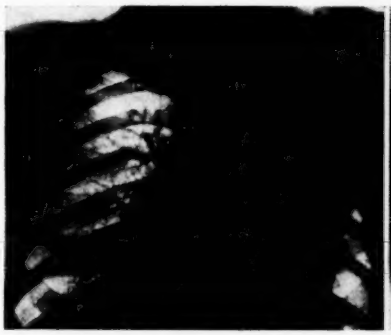

Fig. 1.

Fig. 2.

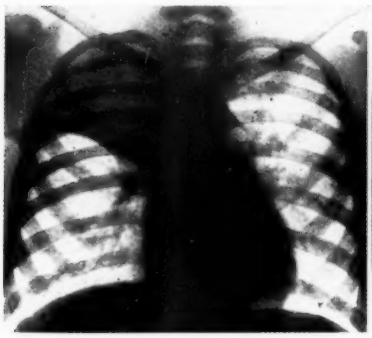

Fig. 3.

Fig. 4.

exist which are capable of altering the normal balance of these elements, hence the volume of the lung.

Five cases are reported, the first of which is that of atelectasis due to a bronchiogenic carcinoma which occluded the left upper bronchus, in which compensatory signs of retraction of the ribs, displacement of the mediastinum, and elevation or paradoxical movement of the diaphragm, were lacking because of the extensive emphysema of the lower lobe. In the second case caused by mediastinitis, paradoxical motion of the diaphragm was present but the failure of the mediastinum to become displaced gave evidence of its inflammatory fixation. The last case, in which two transitory episodes characterized by opacity of the right upper lobe occurred, was believed to be due to reflexes originating in the preexisting pulmonary lesion.

Since the essential condition of the atelectatic state is a reduction in volume of the lung, it would be logical to assume that the prime radiological sign would be an increased density of the involved region. This is not invariably true, however, and the functional compensatory signs may appear without the slightest increase in density on the roentgenogram. The absence of this diagnostic point may be accounted for on the basis of the masking effect of an overlapping emphysematous lobe, or the film may have been made before sufficient air had been absorbed from the alveolar spaces into the blood stream to render the increased density appreciable. Once established, the opacity is rather characteristic. Seen in the anteroposterior view, it is ordinarily homogeneous, much like soft tissues elsewhere, or there may be seen cord-like streaks on a homogeneous base. The major opacity is most often found near the hilus or the bases. The reduction in volume of the lung is best perceived in the lateral view. The flattening of the thoracic cage and the narrowing of the intercostal spaces are familiar signs which, although not always present, are frequently confirmatory. Another radiological sign which may be of value is the unusual visualization of the left bronchus in the lateral projection, as well as the bifurcation of the trachea, a point noted in most of the author's series. In the displacement of the mediastinum, already mentioned, it is interesting to observe that the esophagus is rarely affected, contrary to the situation in a cirrhotic or adhesive process. The paradoxical motion of the diaphragm is well known, as is the diaphragmatic elevation and the pendulous position of the mediastinum.

In conclusion, the author stresses the fact that no single sign is pathognomonic, and the diagnosis must be made with consideration of the picture as a whole, including the etiology and endothoracic mechanics involved. EDITH FARNSWORTH, M.D.

Hanrahan, E. M., Adams, R., and Klopstock, R.: The Rôle of Experimentally Produced Intrapleural Adhesions in Extrapleural Pneumonolysis and in the Prevention of Surgical Atelectasis in Animals. *J. Thoracic Surg.*, 1941, 10: 284.

The search for a simple, non-harmful method of consistently producing obliterative pleuritis has been extended through a large volume of material and a considerable range of experimental methods with informative but variable results. The work has demonstrated that experimental pleural adhesions can be produced by a variety of physical and chemical agents. It is suggested that iodized talc and India ink are the most satisfactory of the substances, both of which depend for their effect upon the action of particulate matter plus chemical irritation. The use of a liquid suspension makes pleural poudrage simpler to perform and easier to control than the use of atomizers or blowers in conjunction with thoracoscopic or manometric control.

Saline solution is a satisfactory suspending medium, but distilled water would seem to have the advantage of being itself a temporary tissue irritant, yet readily absorbable. Ether is effective as a suspending medium but elicits incompatibly violent reactions unless controlled by dilution, or by the use of substances such as oil, which slow its rate of absorption. The effects noted within two months following one or two injections of silica and talc suspension were comparable with those following poudrage in the dry state.

The absorption of particulate matter from the pleural cavity has been studied extensively and much that was previously known has been confirmed. Dry talc poudrage of the pleural surfaces (Bethune) produced adhesions and pleural thickening to only a slight degree and they were localized in extent. Silica poudrage induced marked hyperplasia of the lymph glands; it is suggested that if done repeatedly, the resulting lymphatic blockage might well bring about delayed absorption by the pleural lymphatics and, eventually, diffuse localized reaction. Carbon (lampblack) poudrage was technically unsatisfactory. In general, these substances are more effectively utilized in suspension. The few cubic centimeters of air used to demonstrate the pleural space should not be aspirated after the suspension has been introduced, as its brief presence probably helps to spread the material more widely.

Iodized talc in watery suspension is consistently effective in thickening the mediastinum and the medial portion of the diaphragm, less reliable in the production of medial pleuropneumonic adhesions, and unreliable in the production of lateral adhesions. Marked and readily demonstrated effects followed the use of carbon suspension; commercial India ink was found most suitable for this purpose. India ink is more than a simple suspension of lampblack in water since it contains also a glutinous material. Its effectiveness increases, within the limits of tolerance, by repeated injection at weekly intervals. The results were not uniform, but in general the use of ink was followed by pleural thickening and visceroparietal adhesions. Its staining qualities are of exceptional experimental value. The lymphatic removal of finely ground material such as carbon or silica is extremely rapid, and intense staining of the lymph nodes throughout the mediastinum and medial portions of both diaphragmatic surfaces has been observed within one-half hour after the unilateral injection of India ink. Stiffening of the mediastinum occurs, partly from the physical deposition of a mass of foreign material in the mediastinum and diaphragm, to the point where further lymphatic absorption is impossible. Larger injections result in inspissated nodules of powder on the pleural surfaces, usually dependent in type.

The stiffening is partially due also to the mild inflammatory reaction attendant upon pleural irritation and lymphatic absorption of the irritant material. It is almost impossible, by injection methods, to obtain pleural thickening or adhesions that are other than fine, filmy, and stringy in the lateral and superior portions of the chest wall, and they are rarely numerous enough to be of value in limiting infection or maintaining the lung in an expanded state. The amount of fluid formed is surprisingly small. Organization of the small exudate elicited probably accounts for the diffuse band-like adhesions commonly observed binding the lung to the mediastinal and diaphragmatic pleuræ.

Methods of direct mechanical trauma sometimes result in obliterative adhesions; at other times they fail completely for reasons that are not clear. Serial cauterization of the parietal pleura intercostally provides the most effective method found of producing lateral adhesions, but pulmonary collapse attends thermal injury of the visceral pleura. In small animals (dogs, rabbits, and guinea pigs) which have a scant endothoracic fascia, pneumolysis cannot be carried out unless the parietal pleura has been previously thickened, or unless the parietal and visceral pleural surfaces are diffusely and firmly adherent.

The bacterial and bacterio-allergic irritants used, including killed cultures of bacillus coli, staphylococcus, and tuberculin in vaccinated animals, only exceptionally gave other than negligible results. Oily solutions, such as gomenol, resulted only in trifling pleural reactions, but produced marked hypertrophy of the lymph glands.

Although numerous interesting observations were made, no method of stimulating a fibrinous pleural reaction which would eventuate in fibrous proliferation sufficient to allow the production of a stabilized large extrapleural pneumothorax in animals has been found. Experience has shown that the experimental production of limiting, supportive, obliterative pleural adhesions too often is accompanied by the very ill which it is supposed to prevent, that is, collapse and infection of the lung. Although this is a purely experimental rather than clinical report, it seems pertinent to direct attention to the frequent clinical as well as experimental observations that troublesome postoperative atelectasis in the remaining lobe is almost always a sequel to intrapulmonary infection rather than a precursor of it.

It is suggested that the problem of the unexpanded lobe after operation can be solved better by immediate lung aeration and closure of the chest with negative pressure, possibly assisted by a positive pressure breathing chamber and careful attention to details in the use of all measures which will reduce the hazards of pneumonitis. It is further suggested that there is at the present time no simple or direct method of consistently producing adhesions between healthy pleural surfaces, and that methods which work are too often accompanied by pulmonary collapse and are too violent for human use. The introduction of foreign bodies into tissues or tissue spaces is rarely accepted by nature with permanent tolerance. The application of direct trauma to the delicate pleural surfaces, whether in the form of dry gauze wiping, multiple intercostal incision, or serial cauterization, violates fundamental principles of gentleness and delicacy and it is difficult for the surgical conscience to accept such measures.

CHARLES BARON, M.D.

D'Arcangelo, D.: Extrapleural Pneumothorax (Sul pneumotorace extrapleurico. Contributo clinico). *Rassegna internaz. di clin. e terap.*, 1940, 21: 731.

The author first briefly reviews the literature on extrapleural pneumothorax, especially the contributions of Rotta and Omodei-Zorini. The contributions of the latter authors to the technique of extra-

pleural pneumothorax have introduced a method of therapy which is less destructive than thoracoplasty in situations in which the latter is contraindicated. Rotta in 1936 and 1937 proposed the use of vaseline injected extrapleurally to cause collapse of the infected pulmonary apex. He reported on 12 patients so treated. Omodei-Zorini used and improved Rotta's technique in 1938, when he reported on 10 cases which he treated. A somewhat blunt needle was inserted in the fourth, fifth, or sixth intercostal space at the medial border of the scapula down to the connective tissue between the endothoracic fascia and the parietal pleura. After a manometric reading had shown no fluctuations indicative of endopleural puncture, from 100 to 150 c.cm. of novocaine solution were injected; then a gas, either filtered air or oxygen, was introduced under a positive pressure of from 30 to 40 c.cm. To prevent the rapid absorption of the gas and to maintain the collapse a mixture of pure paraffin vaseline oil which melts at from 38 to 39 degrees was introduced. This was of a semi-solid or paste-like consistency at body temperature. By these methods Rotta and Omodei-Zorini have maintained pulmonary collapse for a long time with excellent clinical results.

The author briefly reports 2 clinical cases treated by extrapleural pneumothorax. The first was that of a twenty-four-year-old male who had had exudative pleurisy on the left side at the age of sixteen years. For the past month he had been suffering from asthenia, cough, night-sweats, and fever, associated with a considerable loss of weight. X-ray examination revealed tuberculous infiltration in both upper lobes. Extrapleural pneumothorax controlled the process, restored general health, and brought the temperature back to normal so that the patient could safely undertake the journey back home.

The second case was that of a twenty-five-year-old male patient who at the age of twelve years had suffered from an exudative pleurisy on the left side which had been cured after four months. In the past year he had suffered from an attack of influenza which was followed by persistent cough, night-sweats, asthenia, and loss of weight. The sputum was positive for tubercle bacilli, and x-ray examination revealed a large cavity in the left apex. Extrapleural pneumothorax at first permitted the injection of 100 c.cm. of gas which later could be increased to 300 c.cm. The general condition of the patient rapidly improved: he gained in weight, his sputum became negative for tubercle bacilli, and his appetite and general health improved markedly. The progressive improvement of this patient obviated the necessity of doing a plastic operation to obliterate the cavity. Refills have been made for the past ten months at intervals of from two to three months, with hope of ultimate cure.

The author concludes that extrapleural pneumothorax constitutes an important addition to the technique of collapse therapy. He emphasizes the rule that in these cases the extrapleural sac must be maintained.

JACOB E. KLEIN, M.D.

Neuhof, H., Touroff, A. S. W., and Aufses, A. H.: The Surgical Treatment, by Drainage, of Subacute and Chronic Putrid Abscess of the Lung. *Ann. Surg.*, 1941, 113: 209.

In the authors' opinion, abscess of the lung in its acute stage is a surgical disease, and it should not be permitted to pass into a chronic stage. The authors believe that the majority of acute abscesses are single lesions and that they are uncomplicated during the first six weeks. After that the abscesses are classified as subacute and they may remain localized or extend by spillover infection and gangrenous extension. Surrounding fibrosis begins in this stage. In the chronic state (after twelve weeks) there are present the features of the subacute abscess plus pulmonary fibrosis and bronchiectasis. The chronic abscess may be single, but is often diffuse and multiple.

Surgical drainage is the treatment of choice in all cases of pulmonary abscess except the diffuse type. The authors prefer to operate in one stage, after having exactly localized the abscess. One or two ribs are removed, the abscess is unroofed, communicating cavities are drained, and the whole cavity is packed with gauze. If the wound is outside of the area of pleural adhesion, they sew the lung to the parietal pleura and drain through the walled-off area.

The chief dangers are cerebral embolism, which is partly avoidable by having the patient in the Trendelenburg position; pleural infection, which should be avoided; and spillover gangrenous bronchopneumonia.

Of 104 patients with acute abscess who were operated upon, 100 are well and 4 are dead.

Of 63 patients with localized subacute and chronic abscesses operated upon, 47 are cured, 4 are benefited, and 10 are dead.

Of 41 patients with diffuse lesions, 5 are cured, 8 are benefited, and 25 are dead.

JULIAN A. MOORE, M.D.

Brea, M. M., and Taiana, J. A.: Diagnosis of the Surgical Disorders of the Thorax; Procedures and Semiological Technique (Diagnóstico de las afecciones quirúrgicas del tórax: procedimientos y técnica semiológica). *Bol. inst. de clin. quir., Univ. de Buenos Aires*, 1940, 16: 675.

The authors present the method of diagnosis which they use in the study of surgical disorders of the thorax and indicate the respective importance of the clinical signs and the examination procedures. Among the semiological procedures, they discuss successively:

1. Anamnesis, with special attention to pain, cough, expectoration, hemoptysis, dyspnea, and changes in the general condition
2. Physical examination
3. Respiratory syndromes, including the condensation, cavitary, atelectatic, pleural, pneumothoracic, mediastinal, and painful apicocostovertebral syndromes and those of paralysis of the diaphragm

4. Laboratory examinations of the urine, blood, feces, sputum, and material obtained by bronchoscopy and puncture, and serological and immunological tests

5. Functional examinations; there are no exact functional tests, but the organic equilibrium of the individual can be evaluated by the axillary and rectal temperature curve, pulse frequency, arterial and venous pressure, frequency of respiration, time of voluntary apnea, vital capacity, basal metabolism and respiratory quotient, concentration of gases in blood and alveolar air, and cardiorespiratory response to effort and to installation of artificial pneumothorax

6. Roentgen examination, including simple fluoroscopy and roentgenography, deep roentgenography, tomography, contrast bronchography, and roentgenography following the administration of a contrast substance or following pneumothorax, pneumoperitoneum, opaque filling of the esophagus, or opaque or gaseous filling of the stomach or colon

7. Bronchoscopy which, however, is contraindicated in grave, debilitated, tachycardiac, and hypotensive cases, in acute pulmonary processes during full evolution, and in serious bronchopulmonary hemorrhage

8. Thoracoscopy

9. Esophagoscopy

10. Cavernoscopy

11. Fistuloscopy

12. Exploratory puncture

13. Exploratory thoracotomy

The systematic use of these procedures leads to the diagnosis of most thoracic disorders. As to special procedures and from the topographic point of view, the pulmonary parenchyma is explored by deep roentgenography and tomography which localize pathological cavities, by artificial pneumothorax which isolates the pulmonary picture, and by thoracoscopy which allows direct inspection of the surface of the lung; the bronchial tract is explored by bronchoscopy, contrast bronchography, and deep roentgenography; the pleural cavity by puncture, simple and contrasting roentgenography, thoracoscopy, and biopsy; and the mediastinum, costopleural wall, and diaphragm are explored by pneumothorax, pneumoperitoneum, and thoracoscopy. Examination of the sputum, puncture fluid, and biopsy material to corroborate or complement clinical data is very important for the etiological diagnosis.

The value of the semiological procedures in the clinical diagnosis of various pulmonary disorders is discussed. In bronchopulmonary cancer, the symptoms can be placed in three groups: those caused exclusively by the tumor (dry and persistent cough, hemoptysis, dyspnea, and bronchial obstruction); those due to complications, such as atelectasis and infection (signs of bronchial dilatation, pulmonary or pleural suppuration, and unresorbed false pneumonia); and those caused by extension (pain, mediastinal, and pleural syndromes, and signs of metastasis to the viscera and lymph nodes). The roentgen picture is specific and its polymorphism well known. The histological diagnosis is made indirectly from sputum and pleural effusions (inclusion method) and directly from bioptic material obtained by bronchoscopy, thoracoscopy, puncture, or thoracotomy. In bronchiectasis, the principal signs are bronchorrhea and hemoptysis and the best procedure is contrast bronchography; deep roentgenography may suggest the presence of the disorder, but bronchoscopy should never be neglected. In chronic pulmonary and pleural suppurations, simple, deep, and contrast roentgenography and tomography, bronchoscopy, and laboratory examination are indicated. In pulmonary hydatids, laboratory and roentgen examinations make the diagnosis possible even in the absence of subjective and objective symptoms; hydatidoptysis, if present, is of great value. In pulmonary tuberculosis, the diagnosis must establish whether the lesion is open or closed, unilateral or bilateral, active or inactive, evolutive or non-evolutive; bacteriological examination is imperative, and is decisive when positive; the study of any form of the disorder requires the use of the various roentgen techniques, thoracoscopy, bronchography, pleurography, fistulography, bronchoscopy, and puncture. In actinomycosis of the thorax, laboratory examination is fundamental and roentgenography and tomography determine the site and extent of the fistulas and cavities. In pulmonary amebiasis, usually of the right lobe, roentgen and laboratory examinations are essential, sputum and material obtained by pulmonary or pleural puncture being used for the latter. In mediastinal tumor, tomography, artificial pneumothorax, and thoracoscopy serve to confirm the suspicion raised by a mediastinal syndrome or a roentgen shadow in this region; useful auxiliary procedures are opaque filling of the esophagus and the tracheobronchial tract with endoscopy of these organs when artificial pneumothorax cannot be instituted.

A large number of pictures illustrate the main points of the article. RICHARD KEMEL, M.D.

Calchi-Novati, G.: Single Congenital Cyst of the Lung (Cisti unica congenita del polmone). *Radiol. med.*, 1940, 27: 556.

Pulmonary cysts have been variously classified. Lanzo groups them under (1) those of bronchial origin, (2) those of alveolar origin, and (3) those stemming from the lymphatic system. Although, as is generally conceded, there are no pathognomonic signs of this lesion, yet in the majority of cases certain signs appear which are sufficient to serve as a basis for diagnosis. These are apt to be infectious or respiratory in character, the latter being associated with modifications of intrathoracic pressure and appearing in the first months of life. The cysts in these cases are often voluminous, and the clinical picture that of pneumothorax. The history is characterized by frequent respiratory infections followed by attacks of progressive dyspnea accompanied by marked

Fig. 1.

Fig. 2.

cyanosis, as well as attacks of coughing with emission of tenacious sputum showing more or less blood, and indicating the communication of the cyst with a bronchus and the rupture of one of the numerous vessels of the wall of the cyst. Sudden death is the frequent outcome of such a condition. Smaller cysts, on the other hand, may escape notice during infancy and attract attention only in later life when signs and symptoms of pulmonary infection may appear. This class of cases has been well described by certain French authors (Pruvost, Leblanc, Delort, and Colestos) who distinguish the latent stage in which diagnosis rests solely upon radiological evidence, the subsequent stage which may be complicated by hemoptysis, followed in turn by the infectious stage, associated by moderate local reaction and leading finally to abscess formation. The whole clinical picture may be mild enough to suggest bronchitis or an early tuberculous lesion until the final stage of walling off produces the features of an encapsulated empyema or a lung abscess of other origin. A further form is sometimes found in conjunction with saccular bronchiectasis.

The roentgenogram reveals a circular and well-defined rarefaction most often involving the lower lobes, particularly the left. In rare cases, in which no communication exists with the bronchus, the cyst may be filled with fluid, and will be opaque, or the presence of an infectious process may be suggested by the local inflammatory reaction and a fluid level. The absence of infection in the rest of the lung fields constitutes further evidence upon which to base the diagnosis of a cyst, as does the constancy or lack of progression of the lesion. The appearance of the polycystic lung is too familiar to require description.

A case is reported of a fifty-nine-year-old male in whom a large cyst was found.

Excluding the "balloon" cysts of infancy, in which the differential diagnosis includes chiefly pneumothorax, and selecting rather such lesions as are typified by the reported case, the entities to be ruled out are chiefly the following: ulcerative tuberculosis, pulmonary abscess, bronchiectasis, encapsulated empyema or pleural effusion, echinococcus cysts, dermoid cysts, and certain blastomycotic tumors. Of these, the tuberculous cavity is perhaps the most difficult to eliminate, although the persistently negative sputum, the comparative well-being of the patient, the absence of other related pathology in the lung, and the delicately delineated symmetrical appearance of the lesion on the roentgenogram are usually sufficient to rule out Koch's infection. Again, if abscess formation has taken place, the presence of the underlying congenital lesion may be very difficult to establish. Here once more, the large size as well as the spherical shape with minimal peripheral inflammation may serve to differentiate the two pictures which may be clinically identical.

EDITH FARNSWORTH, M.D.

Goldman, A., and Stephens, H. B.: Polypoid Bronchial Tumors. *J. Thoracic Surg.*, 1941, 10: 327.

Polypoid bronchial tumors grow as projections within the bronchial lumen and are usually visible through the bronchoscope. Bronchial adenomas are one type of polypoid tumor which have an unusual form of growth. A definite distinction should be made between bronchial adenomas from carcinoma and other distantly metastasizing tumors. Bronchial adenomas are polypoid in form and are amenable to surgical removal. They comprise from 6 to 10 per cent of all bronchial tumors and about 25 per cent of all resectable bronchial tumors. There are 3 types: metastasizing polypoid tumors (carcinoma), locally invasive but not distantly metastasizing polypoid tumors (adenoma), and non-invasive, non-metastasizing tumors (fibroma, lipoma, myoma).

These authors report a series of cases of bronchial adenoma, of which 60.5 per cent occurred in women, while their own cases of bronchial carcinoma showed that only 9 per cent were occurring in women. The prognosis for patients with adenoma is very good: 83.5 per cent of patients lived more than three years, while 71.5 per cent lived more than five years, and 33.3 per cent lived more than ten years. The symptoms and clinical course are associated with wheezing, asthma, irritating non-productive cough, dyspnea, chest pains, choked-up sensations, and respiratory postural discomfort. Later, air becomes completely shut off from the alveoli distal to the tumor and atelectasis results. When air is entrapped distal to the tumor, emphysema occurs. The bronchial obstruction also interferes with drainage of bronchial secretions, after which symptoms appear which indicate pulmonary suppuration. Recurring pneumonia or so-called "drowned lungs" are common, but empyema, abscess, and bronchiectasis also occur. When death occurs, it usually results from suppuration secondary to the tumor, or, more rarely, from complications following treatment.

The slow growth of these tumors results in permanent chronic inflammatory changes in the lungs and pleura. Thus are produced chronic suppuration and toxemia which give rise to fatigue, low-grade fever, chronic cough, sputum, pleuritic pains, dysp-

nea on slight exertion, anemia, anorexia, and all the symptoms usually associated with pulmonary tuberculosis. After many years an astonishing degree of resistance seems to be acquired so that the smouldering infection which may involve even an entire lung flares up less often and produces less disability.

The cardinal symptom of bronchial adenoma is the pulmonary hemorrhage. This hemorrhage is characteristically sudden in onset and termination, bright red in color, profuse even to the extent of producing shock, and unprovoked by cough or exercise. In women, frequently it occurs during the menstrual period. This hemorrhage probably arises from the tumor itself. There is a second type of hemorrhage associated with suppuration of the lungs and this is just as frequent as the former. This is composed of dark blood, often clotted and mixed with pus, is induced by cough and exertion, and is followed by blood-streaked sputum for several days.

Roentgenologically characteristic lobar atelectasis is present. Emphysema and atelectasis are also present in varying degrees. There may be a marked shift of the mediastinum, thick pleuræ, cystic whorls, and abscess cavities resulting from the suppuration. The tumor itself is demonstrated only occasionally.

Tomography will delimit the true morphology as well as the relation of the tumor to the surrounding structures and the extent of the extrabronchial portion of the tumor. Tomographic findings taken together with the bronchoscopic examination are of great aid in differentiating adenomas from carcinomas. An extrabronchial adenoma appears discrete, well demarcated, and smooth in outline, but a carcinoma usually shows a shadow blending with the opacity of inflammatory or atelectatic areas.

Bronchography is valuable in determining the level of the bronchial obstruction and the condition of the distal bronchi. The bronchoscopic image is that of a soft or firm mass or polyp, whitish, pink, or purple, and, if of long duration, indurated and hard. Bronchoscopic removal of the adenoma re-establishes the bronchial airway and brings about a dramatic and marked improvement in the patient, but late recurrences can be expected after such removal.

Histologically, bronchial adenomas are characterized by a uniformity of cell type and absence of mitotic figures and a tendency for the cells to be grouped. Covering the tumor is the mucosa. Beneath this there is the epithelial surface which is often highly vascular. Bone and cartilage are found frequently. Cells are often arranged in patterns of different designs. These designs may be columnar, alveolar, acinar, mosaic, medullary, and angiomatoid in pattern. The histological diagnosis of adenoma is not easy.

There are 3 types of treatment: local treatment, radiation, and pulmonary resection. Local treatment may be accomplished endoscopically or by local resection through a transpleural approach. The endoscopic treatment, the authors believe, is less commonly indicated than it was formerly thought to be because of (1) local recurrences, (2) danger of fatal complications, (3) inability to remove adequate amounts of the tumor, and (4) disabling symptoms from the distal suppurating lung which still remain. Operation by the transpleural approach appears to be applicable to those tumors in which the distal lung has not yet been damaged permanently, in which the size is small, and in which dissection is easy. Radiation therapy probably has little effect upon the tumor itself. The authors state that intrabronchial irradiation has proved too cumbersome and the indications too indefinite. Pulmonary resection appears the ultimate fate awaiting most patients with bronchial adenoma. This is so not only because of the persistence of the tumor itself but also because of the continued presence of distal pulmonary suppuration. J. DANIEL WILLEMS, M.D.

Ochsner, A., and DeBakey, M.: Carcinoma of the Lung. *Arch. Surg.*, 1941, 42: 209.

On the basis of an extensive review of statistics, it is evident that pulmonary carcinoma is absolutely increasing and is becoming a significant problem in the treatment of cancer. A number of theories have been advanced to explain the increase in cancer of the lung. Because of the presence of metaplasia in the bronchial mucosa of persons dying from influenza, it has been suggested that this change is a precancerous lesion. On the other hand, many cases of carcinoma of the lung have no history of influenza. Other chronic specific and non-specific pulmonary infections have also been cited as playing possible etiological rôles in the production of pulmonary cancer. Of these, tuberculosis is probably the most frequently mentioned. This theory, too, has been refuted by reports emphasizing the rare occurrence of cancer and tuberculosis in the same person at necropsy. There is also insufficient evidence at present for considering syphilis of the lung a carcinogenic potentiality.

Of the non-specific chronic inflammatory pulmonary lesions, bronchiectasis and chronic bronchitis have been most frequently cited as possible etiological factors in bronchiogenic carcinoma. Other possible etiological factors include the inhalation of irritating gases (war gas, exhaust gas of combustion motors, and gases arising from tarred roads), the inhalation of radio-active substances, occupational diseases such as pneumoconiosis and silicosis, and tobacco smoking.

The authors have the definite conviction that the increase in the incidence of pulmonary carcinoma is due largely to the increase in smoking, particularly cigaret smoking, which is universally associated with inhalation. Every one of their patients, with the exception of 2 women, was an excessive smoker.

Pulmonary carcinoma occurs principally in the male sex and, as might be expected, usually occurs in older persons. Most of the patients are between the ages of forty and seventy. However, the youngest patient whose case has been recorded is probably that of Weill-Hallé and his associates, who reported

on a primary carcinoma of the lung in a child one year of age. Other patients under ten years of age have also been reported. The oldest patient was ninety-one years old.

At present, it is generally accepted that all pulmonary neoplasms originate from the bronchial mucosa. As regards the location of primary neoplasms of the lung, the right side is involved more frequently than the left. Most pulmonary neoplasms are located centrally, that is, they are of hilar origin.

Based on the macroscopic or morphological appearance, there have been numerous classifications of lung carcinoma. Most frequently the classification used has been squamous-cell carcinoma, small-cell or undifferentiated-cell carcinoma (oat-cell carcinoma), and endocarcinoma. However, the classification which seems most logical to the authors is that proposed by Halpert, based on the development of the cells lining the bronchi, and adequately explaining the histological structure of all primary pulmonary carcinomas. These malignant growths may, therefore, be classified into three types, which depend on the embryological direction of growth: (1) "reserve-cell" carcinoma (the reserve cells are the parent cells of the ciliated, cylindrical, and goblet cells of the bronchial mucosa), (2) cylindrical-cell carcinoma, and (3) squamous-cell carcinoma.

Metastases from primary malignant tumors of the lung extend, as do those from malignant tumors elsewhere, in three ways: (1) by direct extension, (2) through the lymphatics, and (3) through the blood stream. A fourth method of extension is "bronchial embolism," described by Lumsden as surface spread. The authors believe this is an important method of extension and that it is responsible in many instances for the peripheral involvement of the lung in those cases in which the primary lesion originates proximally.

The most frequent sites of metastatic involvement are the regional lymph nodes and, next in frequency, the liver, and the adrenal glands. Other sites of metastases are the bones, kidney, brain, heart, and pericardium. Although the high incidences of metastasis reported in the literature would indicate that the surgical treatment of pulmonary neoplasm is relatively hopeless, it should be realized that these figures are based on autopsy cases in which the tumors obviously were advanced. The fact that in approximately 70 per cent of cases the metastases were limited to the regional lymph nodes makes the prognosis as regards the surgical treatment much better. The fact that metastases do occur most frequently in the regional lymph nodes is significant, because in the surgical extirpation of a malignant lesion of the lung it is as important to remove the regional lymph nodes together with the primary focus as it is to do an axillary dissection for lesions of the breast.

Unfortunately, there are no characteristic symptoms of bronchial carcinoma. The onset of the condition is usually insidious, and the symptoms are disregarded because they are attributed to other causes, particularly smoking. The most frequent symptom of bronchiogenic carcinoma is cough. In many cases there may be no thoracic symptoms, the complaints being of epigastric distress, anorexia, nausea and vomiting, malaise, loss of weight, constipation, and aphasia.

Other thoracic symptoms may be present as evidences of an acute infection, such as acute bronchitis or influenza. Hemoptysis is a relatively infrequent manifestation. Pain in the chest occurs relatively frequently, and may be the earliest symptom of the more peripherally located lesions. Dyspnea, as a rule, occurs rather late in the disease. Pleurisy with effusion may be present in cases of peripherally located tumors with extension to the pleura.

The physical findings in cases of pulmonary malignant tumor are as protean as the symptoms, and are dependent on the location and extent of the lesion and the consequent secondary pulmonary changes. The authors have frequently observed no physical changes in cases in which the diagnosis was made by roentgen and bronchoscopic evidence. In fact, the presence of obvious physical signs is generally indicative of inoperability.

The most important factor in the diagnosis of pulmonary carcinoma is the consideration of its possible presence. It should be suspected in the case of every patient forty years of age or older with cough, hemoptysis, or thoracic discomfort.

The roentgen interpretation of centrally located lesions is generally difficult because of the confusion with hilar shadows produced by other lesions and by normal structures. This is particularly significant because most pulmonary neoplasms occur in the hilar region. In these cases bronchoscopic visualization of the tumor and biopsy of a specimen are of paramount importance as regards the accurate diagnosis. With peripherally located pulmonary malignant tumors, the roentgen diagnosis is dependent on shadows produced by the infiltrating tumor. With centrally located lesions, after the condition has progressed to such an extent that bronchial obstruction occurs, atelectasis of one or more lobes develops, which produces characteristic roentgen shadows and displacement of the mediastinal structures toward the affected side. Bronchoscopy is also a valuable diagnostic method, particularly advantageous in those cases in which the mass does not cast a shadow. Roentgenograms taken after the intratracheal or intrabronchial injection of iodized poppyseed oil may demonstrate partial or complete occlusion of the bronchi. Finally, the presence of malignant cells in expectorated material can frequently be demonstrated microscopically. Aspiration biopsy is condemned because of the danger of metastases occurring in the pleura as a result of the removal of the specimen.

At present, it is the consensus of opinion that the only curative treatment of carcinoma of the lung is surgical extirpation. Numerous workers have observed that irradiation for carcinoma of the lung is

of little, if any value. Although in a number of reported cases simple resection of the involved lobe has been performed, it is the opinion of the authors that any procedure short of total removal of the involved lung is irrational. Only by complete excision of the entire lung can the primary focus be adequately removed. Moreover, lobectomy obviously does not permit removal of the regional lymph nodes. From a technical standpoint, total pneumonectomy is considered a much better procedure, both surgically and anatomically, than is lobectomy.

The authors advocate the use of pre-operatively staged pneumothorax, and the transfusion of unmodified blood.

They use cyclopropane anesthesia, administered under positive pressure. The use of intratracheal tubes is considered to be deleterious, because of the likelihood of the introduction of infection and the increased secretion resulting from trauma. They believe that, with few exceptions, the anterior operative approach is not only adequate but preferable, and they recommend resection of the third rib and its adjoining costal cartilage. Their operative technique is described in detail. In their series of 15 pneumonectomies for carcinoma of the lung, 7 patients recovered and 8 (55.3 per cent) died. A series of collected cases from the literature is also reviewed. In a total of 109 cases, including the collected series and their own cases, 45 patients recovered and 64 (58.7 per cent) died.

SAMUEL H. KLEIN, M.D.

Phillips, F. J., and Adams, W. E.: Obliteration of the Pleural Space Following Pneumonectomy. *Ann. Surg.*, 1941, 113: 221.

Following removal of a whole lung there is an accumulation of a bloody serous exudate in the pleural cavity and gradual absorption of the remaining air. The ribs on that side contract, the diaphragm rises, and there is a shift of the mediastinal structures to the operated side. The exudate gradually becomes organized into fibrous tissue if infection does not take place. The parietal pleura becomes much thickened and tends further to contract that side of the chest.

The authors report the autopsy findings in a patient who died of peritonitis of appendical origin nine months after an apparently successful left pneumonectomy for cancer of the lung:

The entire left chest cavity was lined with a well organized, dense, fibrous labyrinthine shell which contained a brownish, turbid sterile fluid. This shell varied from 0.5 to 2 cm. in thickness. The right lung exhibited no gross evidence of emphysema. The heart was slightly enlarged and adherent to the fibrous-tissue shell. The pericardial cavity was completely obliterated. There was moderate collapse of the left pleural cavity by contraction of the chest wall. The hilar lymph nodes contained carcinoma cells. There was no evidence of distant metastasis.

JULIAN A. MOORE, M.D.

ESOPHAGUS AND MEDIASTINUM

Moersch, H. J.: The Treatment of Esophageal Varices by the Injection of a Sclerosing Solution. *J. Thoracic Surg.*, 1941, 10: 300.

Many procedures have been advocated for the prevention and control of bleeding from esophageal varices. The surgical procedure that has been employed most frequently is splenectomy. However, it has not entirely solved the problem of gastrointestinal bleeding from esophageal varices. Pemberton and others have advocated omentopexy in addition to splenectomy with the thought of assisting in the establishment of an anastomosis between the portal and the systemic circulation, and thus diverting some of the blood that otherwise would pass through the esophageal varices. Ligation of the coronary vein as a possible method of preventing bleeding from esophageal varices has not proved to be entirely satisfactory although this procedure has been of benefit in certain cases.

Pemberton and the author became interested in the possibility of injecting a sclerosing solution into the veins directly through an esophagoscope. An attempt was made to produce varices of the esophagus in dogs, but these men were unable to produce enlargement of the veins in the esophagus. Consequently, the idea of employing the method in the human being remained very much in abeyance. The report of Crafoord and Frenckner encouraged the author to attempt to duplicate their procedure.

The patient underwent esophagoscopy under local anesthesia, and markedly enlarged varices involving the lower third portion of the esophagus were readily found. They were of such size that they almost completely obstructed the lumen of the gullet. They formed large, bluish, nodular prominences which were soft and compressible. A suitable vein was selected for injection and, using a 25 caliber needle, 0.5 c.cm. of a 2.5 per cent solution of sodium morrhuate was injected. The procedure was accomplished with practically no bleeding. Injections were carried out three more times, at four-day intervals, 1 c.cm. of the solution of 2.5 per cent sodium morrhuate being injected on each of these occasions. The change that took place following the injection treatment was very striking.

Sufficient time has not elapsed to determine the efficacy of the injection type of treatment of esophageal varices, and it may be found necessary to repeat the procedure if further bleeding should take place. It is still uncertain whether the injection should precede or follow splenectomy and ligation of the coronary vein.

MISCELLANEOUS

Rehn, E.: Hyperfunction of the Thymus as a Disease. Preliminary Clinical Reports (Die Hyperfunktion des Thymus als Krankheit). *Deutsche med. Wchnschr.*, 1940, 1: 594.

Following the discovery of the thymus hormone by Bomskov, many questions have arisen. The

author limits his studies to hyperfunction of the thymus gland, which he treats in a fragmentary manner.

Thymus function which is important for cell regeneration, may lead to death and disease if continued without proper control. When the glycogen-mobilization necessary for growth oversteps its objective, it may bring on diabetes in children and glycogen impoverishment in the liver. In addition to the development and hypersecretion, antagonistic secretions of the endocrine glands, the thyroid, the gonads, and the adrenals, are suppressed—this occurs especially in times of great hormonal stress of these glands. In addition to the liver disturbances due to thyroid dysfunction, as established in the Rehn Clinic, there is also a thymus dysfunction that causes a glycogen impoverishment of the liver and of the heart and its actions and consequences are labile in the highest degree. As shown in the graphs of Hammar and Wehefritz which were made at various ages of rats, the glycogen content of the liver and of the heart is very low shortly after birth, and then it gradually increases. Since the antagonistic elements of the gonads do not function during childhood, the uncontrolled progress of the status thymicolymphaticus is easily explained. In adults also there is a status thymicolymphaticus which can be shown by the appearance of lymphocytosis and leucocytosis when the thymus hormones are diminished in quantity. In such conditions the glycogen impoverishment of the liver and the heart also causes the lability occurring during the thymic circulatory activities. The functional productivity of the thymus is expressed by its hormone excretion in the urine; this can be measured quantitatively by the method of Bomskov. The hyperplasia of the thymus in cases of Basedow's disease is a positively useful reaction as it produces a quieting and an arresting effect upon the thyroid secretion. The thymus irritation disappears if the patient is treated with iodine; he then becomes operable. When wrong treatment is given, or following early exaggerated hypophysic impulses, the thyroid and the thymus may steadily increase their functional excesses, and there may be such a disease-producing activation that the thyroid will no longer respond to iodine treatment. The thymus controls the entire clinical picture with the highest degree of lability by producing glycogen impoverishment of the liver and of the heart. In such a case only the most cautious diminution of the thymic activity can produce the desired results. Myasthenia in Basedow's disease is not directly dependent upon the thymus, but occurs in a round-about manner following dysfunction of the adrenals. From now on, besides the basal metabolism, the part played by the thymus is to be established; it is now possible to determine this before operation is undertaken.

Cancer patients facing dangerous operations, in whom the author always found a hyperfunction of the thymus, were treated successfully with a thyreotropic hormone of the anterior lobe of the hypophysis, in that the thyroid function which had been reduced by the thymus was reactivated and this caused an improvement in the circulation of the blood and counteracted the toxicity. Similar results were obtained by radiation of the thymus. In lymphogranulomatosis the author found a thymus hyperfunction of such powerful output, that despite the greatest scepsis directed against all attempts to establish its etiology, he believes that the thymus participates most potently, if not exclusively, as the cause of Hodgkin's disease. The favorable results obtained in radiation of the mediastinum in Hodgkin's disease must be interpreted as being due to radiation of the thymus.

Roentgen radiation is to be preferred to operation in such cases. The author obtained favorable improvement in lymphogranulomatosis from roentgen treatment. (Buettner). Mathias J. Seifert, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Baggio, G.: Two Hundred Unselected Operations for Inguinal Hernia without Recurrence (200 operazioni d'ernia inguinale senza esclusione di casi e senza una recidiva). *Policlin.*, Rome, 1940, 47: sez. prat. 1195.

The author reviews the operative results following his modification of Bassini's method of operating on inguinal hernia in 200 unselected cases seen from 1936 to 1939. The author's modification uses the rectus muscle in his own variation of the procedures suggested by W. Scott and by Schley in 1923. The latter used the rectus muscle to strengthen the entire inguinal canal and transplanted the cord above the aponeurosis of the oblique muscle. Schley found at re-operation for a slight protrusion along the cord in 3 cases that the rectus muscle had not separated from Poupart's ligament.

In the author's series of 200 unselected cases there was no recurrence from six months to four years after operation; 2 of his patients had had 2 recurrences with previous surgery. In 1935 the author described his method in detail with appropriate illustrations. He makes an incision from the middle of the groin down to the root of the scrotum and exposes the inguinal canal. The cremaster muscle is dissected free from the cord. The hernial sac is exposed and opened, then ligated and pushed to one side. The cord is separated from the rest of the cremaster, and left at the bottom of the inguinal canal while the cremaster muscle is placed in the anterior part of the canal. The inferior fibers of the fasciæ of the internal oblique and transversus muscles are separated from the transversalis fascia. The lower fibers of the rectus muscle are exposed through the external aponeurosis. The transversalis fascia is then incised medially to the hernial sac, the base of which is now anchored medially in the internal oblique muscle. The peritoneum is sutured at the base of the sac, and the transversalis fascia sutured up to the exit of the spermatic cord. The cord is then elevated and the inguinal canal reinforced by the use of the muscle fibers of the rectus abdominis. The cremaster muscle is then replaced in the posterior part of the canal, and is fixed in position by catgut sutures to the anterior surface of the internal oblique muscle. Finally, the anterior part of the canal, including the superficial fascia and the skin, is closed.

JACOB E. KLEIN, M.D.

Levy, J. H., and Pund, E. R.: Primary Sarcoma of the Omentum; Report of 2 Cases. *Am. J. Cancer*, 1940, 40: 219.

Two cases of primary sarcoma of the omentum are added to the 84 cases which have previously been reported in the literature. One occurred in a white woman, aged twenty-nine, and the other in a negro woman, aged twenty-six. In both these cases, and in many of the previously reported cases, the tumor apparently arose from vascular endothelium. The author concluded from histopathological studies that in the first case the tumor was of hemangioendothelial origin and in the second, of lymphangioendothelial origin. All neoplasms of the omentum do not necessarily arise from the blood or lymph vessels. The fibrosarcoma may be an anaplastic reversion of a benign fibroma. Many sarcomas undergo mucoid degeneration and this leads to the term myxosarcoma. More recently, Menne and Birge have propounded the theory that the majority of these sarcomas have their origin in the lipoblast.

Sarcomas of the omentum have been classified into two groups, the circumscribed and the diffuse. Both of the authors' cases would fall into the first group, although in the first case the tumors were multiple. The soft consistency of these tumors denotes the cellular structure. They frequently attain tremendous proportions in a relatively short time; they infiltrate but generally appear well demarcated. It is not always easy to distinguish microscopically a tumor from an inflammatory reaction. It is generally recognized that inflammatory reactions in fatty tissues such as the omentum bear a close resemblance to sarcoma. On the other hand, masses which at operation were thought to be inflammatory, have later been proved to be sarcomatous by recurrence and metastasis.

Pre-operative diagnosis is difficult but the possibility of an omental tumor should be borne in mind in the presence of an abdominal mass.

The average age incidence of omental sarcoma is in the fourth decade, although cases have been reported from early childhood to senescence. The ratio of females to males is 3 to 2. The onset is usually insidious, with bizarre abdominal symptoms. The tumor may, however, be found accidentally before symptoms arise. As a rule, there is vague abdominal discomfort with a dragging sensation. Occasionally there is an acute onset with severe abdominal pain, which has been attributed to rupture of one or several vessels with hemorrhage into the peritoneal cavity. Torsion may also produce an acute abdominal crisis with surgical shock, but this is infrequent. General malaise, anorexia, loss of weight, nausea, vomiting, constipation, and sometimes diarrhea are the most frequent initial symptoms. Secondary anemia is commonly observed. Fever is an inconstant finding. Abdominal distention is present in more than half of the cases. This is due to ascites, which gradually becomes more pronounced, sometimes reaching tremendous proportions. The ascitic fluid is generally of a hemorrhagic nature. Pressure symptoms and partial intestinal obstruction may occur. A remarkable feature in many patients is the absence of cachexia even in a far advanced stage.

Physical examination reveals an abdominal tumor of variable size and contour in more than half of the patients. It is usually in the midline. In some instances it is mobile and can be pushed from side to side and upward, although, as a rule, it cannot be moved downward. This serves to differentiate it from a primary pelvic tumor. The mass is usually not tender. It is generally little influenced by respiratory movements. When adhesions attach the tumor to some viscus or to the parietal peritoneum, its identification as such is made more difficult. Only 3 cases have been reported in which the diagnosis was made pre-operatively.

The high incidence of recurrence may be due to the mobility of the omentum, which facilitates early implantation. Operative trauma may play an important rôle in distributing implants. Gastric ulcers developed in a number of cases after resection of the greater omentum. This has been explained on a basis of interference with the blood supply.

In view of the early recurrences, the high post-operative mortality, and the small percentage of doubtful cures following operation, excision of these tumors is of little benefit. X-ray therapy should, if possible, be tried before operative extirpation.

JOSEPH K. NARAT, M.D.

GASTRO-INTESTINAL TRACT

Link, K. H.: Small Hemorrhages in the Gastro-Intestinal Tract, with Special Reference to Their Relation to Pseudomelanosis (Ueber kleine Blutungen in den Magen-Darmkanal unter besonderer Berueksichtigung ihrer Beziehungen zur Pseudomelanose). *Arch. f. path. Anat.*, 1940, 306: 611.

Opinions regarding the origin of pseudomelanosis which condition is often found in autopsy are not yet uniform. From 214 observations, the author believes that a definite relation can be established between pseudomelanosis and small hemorrhages of the gastro-intestinal tract. In the research, the author found that on account of the many forms of disease which lead to bleeding in the gastro-intestinal tract the chemicophysiological findings of the occult blood must not be overemphasized. The finding of a small amount of blood or of its derivatives in the feces is only a contributory sign of the disease which is of use only in a combination with a carefully taken history and an extensive general physical examination for the diagnosis of the disease. Small hemorrhages were found in the following: disease of the digestive tract, especially in the stomach; pathological processes of the intestinal walls such as ileus, abdominal typhoid, paratyphoid B; dysentery; carcinoma of the stomach, and large and small intestine, chronic indurated stomach and duodenal ulcers; hemorrhagic erosion of the stomach; polyps in the stomach or large intestine; pressure and splitting ulcers of the large and small intestines; ulceration of intestinal tuberculosis; and intestinal hernia, as well as in metastatic breast carcinoma and in deciduoma malignum. In addition, hemorrhages are also found in the gastro-intestinal tract in disease which lies outside of this tract, for instance, primary carcinoma of the peritoneum; pancreatic carcinoma; gall-bladder carcinoma; cholecystitis; carcinoma of the uterus; acute yellow atrophy of the liver; inflammatory conditions of the kidneys; and malignant tumors, as well as nodular hyperplasia of the prostate. Finally, hemorrhages in the gastro-intestinal tract are also produced by such diseases as lymphatic leucemia and pernicious anemia, also by burns.

Pseudomelanosis of the gastro-intestinal mucous membrane, which has been observed in many diseases, and diseases which produce small hemorrhages in the gastro-intestinal tract are not only responsible for moderate external signs, but also have an internal casual connection. The "pseudo-melanin" is composed of an inorganic or organic combined iron and a sulfurous constituent. One must assume that the iron-containing constituent of the melanin arises in all of these cases from hemoglobin which is produced in the lumen of the intestine. However, one cannot be sure of the origin of the blood from these observations. Three possibilities exist: the blood in occult form passes off in the usual manner, the plasma of the blood that is absorbed from the cells contains hemoglobin, or there may be a combination of these two possibilities. The source of the sulfurous component of the pseudomelanosis is probably explained by the hydrogen sulfide in the intestinal gas. One may also conclude that pseudomelanosis arises if ionized iron or intra-erythrocytic or extra-erythrocytic hemoglobin (hemosiderin) combines with hydrogen sulfide.

(KLAUS WASMUHT). RICHARD J. BENNETT, JR., M.D.

Taylor, H.: Practical Evaluation of Gastroscopy; Carcinoma, Gastroscopy in Dyspepsia, Mucosal Types, Gastrojejunal Ulcer. *Lancet*, 1941, 240:131.

This report from the London Hospital concerns the results of an analysis of 350 cases of dyspepsia in which gastroscopy was resorted to after other investigations were carried out for the purpose of diagnosis. Examinations were made of 32 normal stomachs, 112 stomachs with local lesions, 84 with diffuse lesions, and 99 which had undergone gastro-intestinal anastomosis. In 26 instances failures of examination were reported. In the 12 absolute and 14 partial failures the commonest cause of the failure was distortion of the upper end of the stomach due to a lesion high up on the lesser curve. An inflammatory mass here may prevent the instrument from negotiating the leftward curve of the esophagus as it passes through the diaphragm, or may produce a contraction band across the posterior wall of the upper part of the stomach.

A malignant growth was observed in 34 cases. In 6 the presence of the lesion was known and gastroscopy was carried out to determine its operability. In 28 instances the examination was made to establish the diagnosis. It was an unexpected finding in 14 instances. In another 14 instances it was sus-

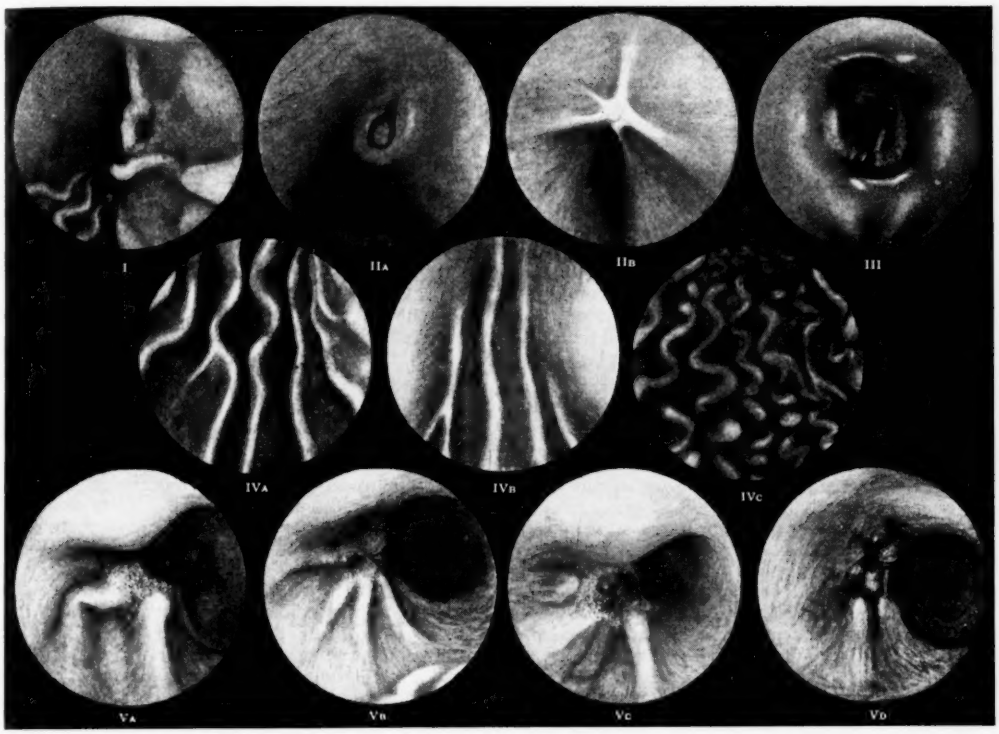

Fig. 1.

I. Early carcinoma. Nodular congested plaque on posterior wall.

II. Healing peptic ulcer. A, at first examination; B, after three weeks of medical treatment.

III. Impending hematemesis in chronic ulcer with acute erosion on its anterior margin.

IV. Mucosal types. A, normal; B, hypoplastic; C, hyperplastic.

V. Malignant ulceration. A, hyperplastic gastritis with ulcer on anterior wall of pyloric antrum; no good evidence of malignancy. B, after four weeks; signs of healing in proximal part of ulcer with suspicious mound of mucosa on further edge. C, after three weeks at convalescent home; little change; base of ulcer obscured by fine froth. D, six months after first examination; undoubted malignant change.

pected but was not confirmed by other methods of examination. In 68 cases in which carcinoma was suspected the lesion was definitely excluded. In this group 25 exploratory operations which would have been indicated on the basis of other methods of examination were avoided because of the negative findings. In 293 cases of carcinoma diagnosed without gastroscopy, 51 resections were possible (17 per cent). In the 28 cases diagnosed by gastroscopy 19 were resected (68 per cent). The value of an early diagnosis is clearly indicated. Repeat examinations are also of value in differentiating ulcer from carcinoma. A supposed benign lesion proved to be malignant in 8 cases, while in 14 other cases benign lesions were established when other examinations indicated the presence of a malignant lesion. The usual test meals and therapeutic tests are frequently misleading since acid is present in two-thirds of the early cases of carcinoma and may be increased in amount in some. Frequently, carcinoma develops in a stomach which is the seat of gastritis. A therapeutic test may be followed by relief from the symptoms but the malignant lesion will continue to grow. Gastroscopy obviates consideration of the dubious findings of the test meal or the therapeutic test.

In dyspepsia gastroscopy is advisable when constant recurrence of the symptoms or incomplete relief from them suggests that a more exact investigation than roentgenography or a test meal is needed. In 32 instances the stomach was discovered to be normal in spite of the gastric symptoms and a complete reorientation of the case was necessary. The examination may reveal an unsuspected ulcer, the presence of antral spasm, or perhaps a diverticulum, conditions which lead to essential modification of the treatment. With gastroscopic control in ulcer cases,

both patient and clinician are encouraged to persist with treatment until the crater has gone and the distortion of the scar has subsided. Impending hematemesis from an ulcer may reveal itself by the visible extravasation of blood through the softened wall of an artery lying beneath it. This process seems to continue for some time before the vessel itself gives way, and the seepage results in a low, velvety, cushion-shaped, pinkish mound in the yellow base of the ulcer.

Gastroscopic evidence has lent increasing support to Hurst's view that people tend (probably from birth) to have gastric mucosæ of different types—normal or average, hyperplastic, and hypoplastic. An atrophic mucosa must be considered an acquired pathological condition in itself, associated with definite derangement of function. Hyperplastic and hypoplastic states appear to be physiological variants from the standard and are not essentially associated with disturbance of function. They are, however, particularly susceptible to gastric disease: 75 per cent of the patients had one or another of these types of gastric mucous membrane, although Hurst suggests a general incidence of 20 per cent. By watching the progress of treatment gastroscopically, it appears that while the superadded gastric disease can be cured or mitigated, the type of mucosa remains unaffected, at least over a considerable period. The height of the gastric acidity and the degree of development of the mucosa correspond, but the amount of variation in the acid secretion in patients with similar mucosæ is considerable. While hyperacidity is associated in general with hyperplasia, and hypo-acidity with hypoplasia and gastritis, individual cases vary through such a wide range that the acidity is not a reliable indication of either the type or condition of the gastric mucosa. Gastric ulcers tend to arise more often in hyperplastic stomachs, but many occur in the presence of normal mucosa. Gastritis was present in all cases of active ulceration and it seems that although an increased acidity increases the tendency of an inflamed mucosa to break down, a normal or even subnormal acidity may digest a mucosa in which resistance has been depressed by chronic inflammation.

Duodenal ulcers appear to be invariably associated with a hyperplastic mucosa—usually of a more marked degree than in gastric ulcer and so much so that absence of hyperplasia in the gastric mucous membrane is strong evidence against duodenal ulceration. By taking into account the degree of hyperplasia of the mucosa as well as the extent of scarring and distortion around an ulcer, the gastroscopist can give a good opinion as to the prognosis and treatment of the case.

The severest form of hyperplastic gastritis is found in patients with persisting or recurring symptoms after gastro-enterostomy for peptic (usually duodenal) ulcer. The worst cases are those which have progressed to anastomotic ulceration. The type of mucosa tends to remain constant for the individual, and the hyperplasia at least must have existed before the original ulcer for which the anastomosis was made. Such a mucosa is inevitably subject to recurrent attacks of gastritis, both before and after the operation, which result in duodenal and anastomotic ulcers, respectively. The pathology is basically the same in each case and there is no evidence of different origins for the earlier and later phases of an essentially continuous process. The stoma has been incriminated on the grounds that the hyperplastic gastritis is severe and localized to the region of the opening. A posterior gastro-enterostomy opening is placed at the site of greatest anatomical rugosity—the greater curve and posterior wall. Hyperplastic gastritis appears prominent here, but it is important to distinguish between the hyperplasia (the rugosity) and the inflammatory changes. In 86 patients with symptoms after gastro-enterostomy, mostly for duodenal ulcer, none had any special concentration of inflammation of the gastric mucosa toward the stoma, except at the suture line itself or near an established ulcer. Of the cases with original ulcer only those with the greatest mucosal hyperplasia would be likely to go on having symptoms in spite of the gastro-enterostomy; the milder cases would be cured by it. In each of 3 control cases which were symptomless for some years after gastro-enterostomy for established duodenal ulcer, the hyperplasia was only moderate and none showed any evidence of gastritis in spite of the stoma. It appears that the operation of gastro-enterostomy, which can be relied on to cure a duodenal ulcer, is safe from the complication of gastrojejunal ulcer only if the degree of hyperplasia in the gastric mucosa is not excessive. Partial gastrectomy should be done in patients with severe hyperplasia.

In the 86 cases of gastro-enterostomy with persistent symptoms diffuse hyperplastic gastritis without ulceration was the most frequent finding but local lesions included 3 carcinomas, 9 ulcers of the lesser curve, and 15 gastrojejunal ulcers; 4 of the latter were not directly observed but their presence was inferred from a localized area of severe nodular gastritis at one part of the stomal ring which obscured the crater itself. Partial gastrectomy had been performed in 13 patients with postoperative symptoms and 6 of these had a jejunal or gastrojejunal ulcer. These figures rebut the contention that recurrent ulceration does not follow this operation.

The author concludes that the gastroscope introduces anatomical and pathological exactness into the study of dyspepsia. Its wider application may produce a substantial decrease in mortality from carcinoma of the stomach and morbidity from gastritis and peptic ulceration.

MANUEL E. LICHTENSTEIN, M.D.

Serebrennikoff, L. V., and Snezhkoff, V. P.: Experimental Studies on Palliative Operations for Perforated Peptic Ulcers. *Nov. khir. arkh.*, 1940, 47: 39.

Omentum is extensively used for the re-inforcement of sutures in the closure of perforated peptic

ulcers, but is not suitable for occlusion of the perforation itself as it easily succumbs to infection and also frequently undergoes cicatricial degeneration, because of a poor blood supply following suture.

In search of a more suitable material, the author formulated the following requirements: the tissue used for occlusion of the perforation must be sufficiently resistant to infection, must not become entirely transformed into a non-elastic scar, and must allow the development of sufficient vascularization. It occurred to the author that pedunculated seromuscular flaps obtained from the gastric wall meet such requirements. In experiments on dogs he found that excision of the ulcer is essential because it removes the focus of infection and creates better conditions for healing. The flap was turned outside in, i.e., the serous surface was attached with catgut sutures to the surrounding mucosa while the muscular layer of the flap was united with the corresponding layer surrounding the perforation. Forty-five days after the operation a complete regeneration of the mucosa within the area of the former perforation was found. The submucosa also was present forty-five days after the transplantation. Apparently the development of the submucosa was due to a metaplasia of the serous epithelium into connective tissue. The muscular layer preserved its vitality.

JOSEPH K. NARAT, M.D.

Glenn, P. M.: Intestinal Obstruction; Results of Treatment with the Use of Intestinal Intubation. *Am. J. Digest. Dis.*, 1941, 8: 35.

The author has reviewed a series of cases of intestinal obstruction for the four years preceding July, 1938, and has compared the mortality with that for the period from July, 1938, to April, 1940 (Table 1).

TABLE I.—MORTALITY RATES IN CASES OF INTESTINAL OBSTRUCTION IN THE STUDIED PERIODS

	No. of Cases	No. of Deaths
July 1934, to July, 1938	49	20 (40.8%)
July, 1938 to April, 1940	67	16 (23.8%)
Not intubated	15	9 (60.0%)
Intubated	52	7 (13.4%)

Of course, there are differences in the groups which it is impossible to evaluate. In regard to treatment, however, the chief difference has been the use of the Miller-Abbott tube in most of the second group. However, with the passing years more meticulous attention has been given to correction of fluid and electrolyte disturbances, which undoubtedly also contributed to the decreased mortality.

In the author's experience, the most gratifying results are obtained in postoperative cases complicated by peritonitis and obstruction. In pure paralytic ileus, decompression in the intestinal tube is the only uniformly reliable therapeutic measure (Table II).

TABLE II.—MORTALITY RATES IN CASES OF INTESTINAL ILEUS IN WHICH INTESTINAL INTUBATION WAS UTILIZED

Type of ileus	No. of Cases	No. of Deaths
1. Paralytic (neurogenic) ileus	3	0 (0%)
2. Postoperative ileus	14	1 (7.1%)
3. a. Mechanical obstruction (non-neoplastic)	27	3 (11.1%)
b. Mechanical obstruction (neoplastic)	8	3 (37.5%)
Total	52	7 (13.4%)

Good results are also obtained in all other types of obstruction. The use of the tube is indicated in any case with small-intestinal distention except when there is interference with the blood supply of the intestine, or external hernias are present. It is particularly useful in obstructions of a subacute or chronic nature, which in the author's experience were present in about two-thirds of the cases admitted with obstruction.

In cases in which the obstruction is caused by a self-limiting disease, such as an inflammatory process, intestinal intubation can sometimes obviate a surgical procedure.

Colonic obstructions usually present the greatest difficulty and yield the poorest results from intestinal intubation.

Interference with the blood supply of the intestine remains a surgical emergency and contraindicates any delay of intubation. It must be remembered that strangulation may occur during the course of intubation and one must always be on the alert for this complication. SAMUEL H. KLEIN, M.D.

Erba, L.: Intussusception of the Colon (Invaginazione colo-colica acuta nel bambino). *Radiol. med.*, 1940, 27: 623.

The author reviews the literature on intussusception of the colon and adds 1 to the few reported cases.

The subject was an eighteen-month-old male infant who manifested severe abdominal pain, nausea, vomiting, and a palpable tumefaction in the left upper quadrant. By means of a barium enema a segment of the transverse colon about 4 cm. in length which filled with difficulty and revealed the radiological features of intussusception was discovered.

The invagination was reduced by the opaque medium which was administered under increasing pressure. EDITH FARNSWORTH, M.D.

Wood, G. O.: Resection of the Colon by Intussusception. A One-Stage Interiorization Procedure Resulting in an End-to-End Anastomosis. *Arch. Surg.*, 1941, 42: 508.

The author produces an intra-intestinal interiorization of diseased bowel into the lumen of the distal bowel and a slough of the interiorized portion as a

result of artificial ischemia. This implies that the operation is limited to lesions that can easily be intussuscepted into the bowel distal to them. Naturally, only small tumors, pre-fibrotic ulcerative colitis, diverticulosis, and multiple polyposis are amenable to this treatment. Sixteen dogs were operated upon by Wood, with no early postoperative deaths, and convalescence was uneventful in every instance. The success of the operation depends on:

1. Avoidance of strangulation. This is accomplished by removal of the mesocolon from the bowel to be invaginated.

2. Prevention of intestinal obstruction and postoperative distention of the bowel proximal to the intussusception.

3. Using a method by which intussusception can be readily produced. Both (2) and (3) are taken care of by the use of an indwelling hard red rubber suction tube about 1 cm. in diameter.

4. Delay of amputation of the intussusception. This is done by means of a ligature placed to cut off its blood supply when and where desired.

The pre-operative essentials are:

1. Thorough cleansing of the bowel distal to the segment to be resected.

2. The hard rubber tube should have narrow rolls of adhesive tape placed as shown in Figure 1.

The ileocecal region of the dog was chosen because it would seem to offer such difficulties as would probably be encountered in man.

The abdomen is incised according to the indications. The segment of bowel to be removed is mobilized and its mesentery excised. This eliminates most of the dangers of strangulation, intestinal obstruction, and the surgical shock that might follow if denervation and devascularization had not been done before the intussusception was undertaken. An assistant passes the tube per rectum until the operator feels it near the peritoneal reflection of the rectum. The operator then directs the passage of the tube up through the segment to be resected far enough until the two larger rolls of adhesive tape will be from 2 to 3 cm. proximal to the center of that segment. This permits doubling of the intussusception after the application of the necrotizing ligature. Umbilical tape or a broad ligature is placed between the two larger rolls of adhesive tape for the purpose of producing friction, but not drawn tight enough to diminish the lumen of the tube.

Fig. 1. Diagram of a longitudinal section through the completed anastomosis. *A*, serosal approximating sutures; *B*, necrotizing ligatures which will produce necrosis of the shadowed intussusceptum (*B* to *E*); C, the intussuscipiens; *D*, rolls of adhesive tape on the indwelling rubber tube, which serve to hold the initial ligature; *E*, initial, or "intussuscepting," ligature.

After the bowel has been anchored to the tube, the operator produces downward traction at its distal end, while an assistant simultaneously applies similar efforts at the protruding anal end of the tube. The intussusception should be increased, until its base is from 1.5 to 2 cm. from the mesenteric borders. This will leave sufficient viable bowel above the base of the intussusception for completion of the anastomosis.

Umbilical tape is then tied about the base of the intussusception to maintain it and to serve as a fixed apex for the second intussusception. The tape should be placed so that the smallest possible lip of the intussuscipiens is proximal to it. This will facilitate the next step, doubling the intussusception or reintussuscepting the bowel. A rubber band is then tied snugly around the base of the intussusception to aid in the production of necrosis, and thus amputation is effected through all the layers of the intussusceptum. Crushing clamps must be avoided.

Next, further traction is applied to the rectal tube while the surgeon grasps the bowel and aids in the production of another very short intussusception over the two ligatures at the base of the first intussusception, i.e., a double intussusception results with the apex of the second, short, viable intussusceptum pointing into the healthy part of the proximal bowel.

The mesenteric defect is then repaired, and interrupted submucosal sutures are placed between the bowel above and the intussuscipiens below. One of these sutures is left long so that it may later be pulled through an opening made in the omentum and then be sewed to the parietal peritoneum to forestall any further intussusception. A second row of anastomotic sutures is placed around the circumference of the bowel. Silk sutures are most satisfactory.

The abdomen is closed and excess rubber tubing protruding from the rectum is removed. When necrosis is complete the tube and the intussusceptum will pass via the rectum.

This method of colonic resection and end-to-end anastomosis combines all advantages of the usual extra-abdominal exteriorization procedure plus the elimination of exposure to postoperative leakage and infections due to fecal contamination.

This resection is designed as a one-stage operation, although the presence of obstruction or subacute perforations necessitates preliminary colostomy proximal to the region involved, together with the usual precautions that good surgery implies. In early diagnosis of colonic lesions, this method is ideal.

The author has not yet applied this method clinically, but attempts to predict, to a certain extent, what its indications and contraindications will be.

MATHIAS J. SEIFERT, M.D.

Nassau, C. F., Lorry, R. W., and Pulaski, E. J.: Treatment of Appendicitis at Frankford Hospital; A Thirty-Six-Year Survey of 4,650 Cases. *Arch. Surg.*, 1941, 42: 296.

This paper is the report of a study of all patients admitted to the hospital from 1904 to 1939 with a primary diagnosis of appendicitis, who were operated upon primarily or who died without operation.

A McBurney incision was made in the cases of the men and children, and a right rectus incision in the women. The appendix was removed in all cases unless there was abscess formation or peritonitis, in which cases removal might necessitate undue trauma and spread of infection. When frank pus was found, the wound was left open without suturing and a dressed drain was placed into the bottom of the pelvis. Postoperative care included thoughtful use of Wangensteen suction, intravenous infusions, transfusions, and small doses of morphine.

The mortality rate for the entire group was 3.27 per cent, and was found to be higher in the male group than in the female because of the greater incidence of complicated forms of appendicitis in the former.

All cases were classified pathologically into one of five groups: acute catarrhal appendicitis, acute gangrenous appendicitis, acute appendicitis with perforation, acute appendicitis with perforation and abscess formation, and chronic appendicitis. The more advanced forms of the disease were encountered in 35.8 per cent of the patients.

The authors found a general decline in the mortality rate during the period of the last five years in all types of the disease except appendical abscess.

The operative mortality in the cases of 1,800 patients with acute catarrhal appendicitis and 1,190 patients with chronic appendicitis was 0.44 and 0.59 per cent, respectively. The mortality rate in 1,159 cases of gangrenous appendicitis was 3.5 per cent, although there were no deaths during the last five years in 338 cases. An appendical abscess was found in 135 cases. Although 12 of the patients died, no operation was done on 3 of them. The operative mortality rate was 6.6 per cent. There were 356 cases of acute appendicitis with perforation and peritonitis, 84 of which were fatal; however, 21 of the patients had no operation, which makes the operative mortality rate 17.6 per cent.

General peritonitis was the cause of death in 59.8 per cent of the fatal cases. Intestinal obstruction caused 12.5 per cent of the deaths, myocardial insufficiency 9.8 per cent, and pneumonia 5.9 per cent. Other conditions which were responsible for death were embolic phenomena, nephritis and uremia, and the complications of fecal fistula, diabetes mellitus, diverticulitis, and gangrene of the omentum in incarcerated hernia.

EDWARD W. GIBBS, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Bernhard, F.: The Present Status of Surgery of the Biliary Tract (Der neueste Stand der Gallenwegschirurgie). *Chirurg*, 1940, 12: 341.

Bernhard has defined the status of surgery of the biliary tract in an exceptionally clear fashion on the basis of the prolific material from his clinic (6,370 cases). He believes that cholecystostomy has been unjustly forced into the background by cholecystectomy for a long time. In severe general conditions and in advanced age, however, it has maintained its rightful place. In contrast to removal of the gall bladder, it is an emergency operation for gall-stone disease. In chronic inflammation, which is most commonly encountered, one can no longer speak of function of the remaining gall-bladder mucosa; this has been proved by cholecystographic investigations.

Two complications of cholecystostomy can be avoided: (1) dense adhesions between the liver and abdominal wall, by means of the water-tight-drainage cholecystostomy of Poppers rather than suture of the gall-bladder opening to the anterior abdominal wall; and (2) mucous fistula which occurs when stones are overlooked in the gall-bladder neck or cystic duct. The latter may be avoided if one satisfies himself at operation that backflow takes place from the cystic duct into the gall bladder. Further, cholecystostomy is recommended in severe hepatogenic icterus, in which condition it occasionally saves lives. The author disputes Geissendoerfer's contention that in empyema of the gall bladder, cholecystostomy should be done first and cholecystectomy should be undertaken later. Likewise, he is opposed to a two-stage plan of action for stone in the common duct since the secondary operation will be necessary in from 10 to 20 per cent of the patients. At the Giessen Clinic it has been necessary in 12.5 per cent. In contrast thereto, cholecystectomy has required secondary operation in only about 1.5 per cent of the patients.

In regard to cholecystectomy the author holds that it is unimportant whether the gall bladder is removed from the cystic end outward or from the fundus inward. Concerning the question of removal during the acute stage or during quiescence, Enderlen and Hotz had a mortality of 13.1 per cent during the former and 6.8 per cent during the latter period. Bernhard advocates delay. Very frequently involvement of the pancreas is responsible for the severity of the clinical picture, which may be proved by determination of the urinary diastase. This is necessary in all cases, during the acute attack as well as in cases in which indications for operation are un-

certain. This determination is also necessary in order to decide upon opening of the common duct, since the diastase value is elevated in half of the cases of stone in the common duct. Following operation, daily diastase determinations should be made, because sometimes otherwise inexplicable conditions may thereby be understood. The Giessen Clinic delays intervention in acute inflammatory conditions, and the author has never observed perforation or complications as a result. Daily leucocyte counts are necessary. On the other hand, the sedimentation rate gives little information during the first few days. Only later persistence of accelerated sedimentation is an indication for operation. Delayed management requires the withholding of food and fluids by mouth for one or two and possibly for three days. Fluids are given per rectum and heat is applied.

In regard to disturbances of motility, Bernhard acknowledges the hypertonic gall-bladder stasis with a hypertrophied sphincter at the bladder neck (vagus), and the hypotonic (sympathetic) type of Westphal. Both can produce typical gall-bladder colic and even pancreatic necrosis. With an associated higher opening of the duct of Wirsung into the choledochus, pancreatic juice may flow into the common duct. These are the cases in which one finds nothing at operation. The riddle can be solved by examination of the gall-bladder bile, which contains diastase. This also explains the origin of biliary peritonitis without demonstrable perforation. In such cases the gall bladder should be removed. The dyskinesia leads further to a discussion of the stippled gall bladder, which, according to Westphal, originates because of hypertonic gall-bladder stasis. Aschoff denies this. In thirty years 443 cases, frequently associated with jaundice, were encountered at the clinic; adhesions were usually present and the pancreas was covered in 70 instances. The diagnosis is difficult. For the most part the complaints were those of gall-stone disease but with negative cholecystograms. Tests of pancreatic function are decisive. At operation one often sees nothing except adhesions. Sometimes the gall bladder has lost its color. Occasionally stippling is visible or can be ascertained by rubbing over a fold of the gall-bladder wall. Permanent results are somewhat poorer than after removal of the gall bladder altered by inflammation, and for this reason the indication must be more rigidly established than in gall-stone disease. Successful conservative management is impossible. Bernhard regards Pribram's fulguration of the mucosa as worthless.

The mortality at the Giessen Clinic following intervention in 667 patients was 5.4 per cent; this included both the most serious cases and cases of tumor. After cholecystectomy alone it amounted to 3.5 per cent. Peritonitis hardly played a rôle, but heart and lung complications were significant. Improvement can be obtained through the employment of local anesthesia which can even be carried to the point of opening the common duct. External palpation of the choledochus does not reveal whether this duct contains stones. Kirschner and Nordmann consider it necessary to open the duct in order to determine this. Bernhard believes this is superfluous and in the seriously ill a dubious procedure.

Roentgenologic visualization of the biliary tract from the cystic duct onward during the operation provides a certain measure of information. Before entering into particulars of Mircz' cholangiography the author discusses incision of the common duct. After this there are three possibilities: (1) common-duct drainage; (2) closure by suture or possibly dilatation of the papilla; and (3) the performance of an anastomosis with the duodenum.

In using drainage one will never be able to dispense with the Kersch T-tube or the Nelaton catheter. The effect of prolonged loss of bile in the older patient has always been underestimated. At most 50 c.cm. of bile can be replaced through repeated daily infusions. Heavy loss of bile brings about comatose states which can be spectacularly improved by blood transfusion.

In regard to closure of the duct, this procedure is entirely justified with a widely patent papilla and a good biliary flow. Dilatation of the papilla has had no recognition. However, suturing the duct harbors the danger of bile leakage and biliary peritonitis as a result of which the clinic has lost several patients. Nevertheless, the dangers of bile loss in patients over fifty years of age are greater than the danger of biliary peritonitis. When the condition of the papilla is not without objection and the passage through the lower choledochus is not satisfactory, Bernhard performs choledochoduodenostomy. This merits a broader application. With an external biliary fistula one should never omit a contrast visualization of the biliary tract. Gall stones reveal themselves as filling defects. One should make use of this expedient not only after cholecystostomy but also after drainage of the common duct. The author recommends cholangiography from eight to twelve days after operation. If the contrast material passes into the duodenum with ease, drainage is not necessary, and in cases in which the drain is ordinarily left in place for eighteen days it may possibly be removed one week earlier. Ether instillation for the dissolving of stones, as advocated by Pribram, is advised against because it causes severe irritation. Beautiful pictures are obtained by cholangiography during operation with Kirschner's spinal anesthesia and local infiltration. Attempts made with spinal anesthesia during operation at the clinic gave no gratifying results. Therefore after removal of the gall bladder perabrodil or uroselectan was injected into the biliary tract through the cystic duct under local anesthesia. The casette was under the patient and a portable roentgen screen was used. By this means the indication for a further operative procedure after cholecystectomy could be ascertained. If narrowing of the common duct as a result of chronic pancreatitis or stenosis of the papilla presents itself choledochoduodenostomy is performed. The examination

causes delay and one should therefore employ it only in doubtful cases, but with technical improvements one can reduce the length of time required. The best films are obtained with local anesthesia and with the patient holding his breath, but one can also obtain valuable evidence which will show whether further operative procedure is necessary with general anesthesia. Up to this time 47 cholecystoduodenostomies and 17 cholecystogastrostomies have been performed at the clinic. Differences in the late results are not apparent. However, the author prefers the former for it produces physiological conditions, and retrograde filling of the gall bladder with food particles, which leads to inflammation and stones, does not occur so easily. A short-circuiting operation between the gall bladder and stomach is considered only if an irremovable obstacle is the cause of biliary obstruction, and the choledochus, because of stenosis, is unsuitable for anastomosis; or if cholecystectomy with added revision of the common duct cannot be tolerated in a severely ill and icteric patient.

In general one should make a practice of removing the gall bladder as the seat of stone formation in gall-stone disease and employ choledochoduodenostomy for establishing an internal biliary fistula. In contrast, the gall bladder is preferably employed in cancer of the common duct or pancreas since the tumor involves the internal bile fistula later. It is often difficult to determine at operation whether cancer or a chronic inflammatory process is present. In this respect, also, roentgen studies are helpful, especially in determining the prognosis after operation by a comparison of two films taken with a time interval between.

Ascending inflammation and fatal cholangitis following choledochoduodenostomy has been too much feared. The danger is overestimated. Investigation at the clinic showed that choledochoduodenostomy in 50 cases led only 3 times to a fatal cholangitis. In these, however, it had been done as a palliative procedure, for at the time of the first operation the established inflammation was beyond remedy. This unfortunate result cannot be attributed to choledochoduodenostomy as such. Cholangitic symptoms also occur after choledochoduodenostomy for tumors. Regurgitation of contrast media into the biliary tract has occasioned rejection of choledochoduodenostomy. This occurs, however, only when the biliary tract is dilated as a result of long standing gall-stone disease and secondary inflammation, and further when the first operation has furnished inadequate correction of the situation. The author has seen the dilated biliary duct following choledochoduodenostomy gradually become smaller and narrower again in the course of time. In any event this operation is very efficient in cholelithiasis and not solely an operation of necessity. In 66 cases the mortality was only 1.5 per cent. For contrast there was a 9.9 per cent mortality in 1,000 choledochostomies. The former operation appears to be indicated even in the most severe and, to a degree, in desolate cases. In frank jaundice blood transfusion is second only to direct exposure of the skin to the sun's rays for the production of Vitamin D. If possible, ether anesthesia should not be used because of its effect on the liver. After operation continuous intravenous infusions of fluids are made and the patient is gotten up after three or four days. Bernhard always makes a supraduodenal anastomosis, a longitudinal incision in the choledochus, and a transverse cut in the duodenum placed not so high that too long a segment of choledochus is excluded from the circuit. Since the employment of preliminary blood transfusion and local anesthesia the author has not seen cholemic bleeding. The hope which had been placed on Vitamin A does not appear to have been realized.

In 109 of 6,254 operations a spontaneous internal biliary fistula was seen. This fistula as well as the gall-stone obstruction of the bowel can be ascertained with a roentgenogram which shows the accumulations of gas.

In regard to complications, stomach symptoms can be relieved by operation in 70 per cent of acute and in only 40 per cent of chronic cases of cholecystitis. Therefore, one should restrain operation in catarrhal inflammation of the gall bladder. Removal of the gall bladder is not responsible for gastric symptoms. Stomach complaints following operation frequently give rise to the question of ulcer. One should not be deceived by a niche, which is often a result of adhesions. Only occult blood proves its existence. The clinic has carried out a follow-up of 3,600 patients by questionnaire. Only 10 per cent of the patients had severe complaints. Six tables and 15 illustrations are included in the original article. (Franz). JOHN L. LINDQUIST, M.D.

MISCELLANEOUS

Sandler, B. P.: Chronic Abdominal Pain Due to Hypoglycemia. *Surgery*, 1941, 9: 331.

The author calls attention to the fact that a chronic hypoglycemic state may produce chronic recurrent abdominal pain, the pain often leading to unwarranted laparotomy. Five such cases are presented in detail to illustrate the point that patients suffering from an abnormal glucose metabolism in the form of hypoglycemia are often mislabelled "neurotics" and are subjected to many operative and diagnostic procedures in vain, when, in fact, a glucose tolerance test will make the diagnosis clear.

From varied experimental work of others, the author believes that increased gastric motility and even tetany of the stomach is produced by hypoglycemia. This increased gastric activity, together with increased activity of the biliary tract, results in the recurrent attacks of pain. The pain may be generalized or localized. It may be localized to the epigastrium, to the right upper quadrant with radiation to the back or shoulder, or to either or both of the lower abdominal quadrants. Associated with a state of hypoglycemia there is often tremor, sweating, pallor, tachycardia, and severe headaches. These

latter symptoms may overshadow the abdominal symptoms. In 2 of the cases reported, the headaches were so severe that the individuals underwent diagnostic procedures as brain-tumor suspects. The headache is thought to be due to increased capillary permeability as a result of the metabolic disturbance, with escape of fluid into the surrounding brain tissue.

Curiously enough, treatment of this hypoglycemic state is most successful with the employment of low carbohydrate diets with increased protein and fat (carbohydrate, 75 to 100 gm.; protein, 75 to 125 gm.; fat 100 to 150 gm.), with between meal feedings and bedtime feedings. The success of this paradoxical type of feeding is explained by the author as follows:

The hypoglycemic state is not due to increased pancreatic activity, but is due to inhibition of the liver glycogen output. The ingestion of carbohydrate-rich foods inhibits the liver output of glucose in such a way as to bring about hypoglycemia. On a low carbohydrate intake such suppression is avoided and subsequent hypoglycemia prevented.

Of the 5 patients reported on in detail, 3 had had an appendectomy, 1 a cholecystectomy, and 1 a herniorrhaphy. One of the patients had, in addition, undergone encephalography twice because of headaches. In no case were the symptoms relieved by the operative procedure. Glucose-tolerance tests showed the highest blood-sugar concentration to be not more than 145 mgm., and in some of the cases the blood-sugar concentration did not rise above 100 mgm. The lowest blood sugar value was usually in the neighborhood of 50 mgm. Two of the patients had the typical "flat" type of curve. All the patients were either entirely relieved or greatly benefited with the low carbohydrate diet, although the effect was obtained in some instances only after several weeks of the diet.

The author believes the disorders masquerading as pseudo-ulcer, chronic appendicitis, abdominal migraine, effort syndrome, and neurocirculatory asthenia are, in fact, due to chronic hypoglycemia. Unpleasant emotional states, psychic trauma, and worry may derange the carbohydrate metabolism and lead to functional disorders. There is considerable theoretic discussion regarding this phase.

LUTHER H. WOLFF, M.D.

A SURVEY OF ESTROGENIC DOSAGE

Collective Review

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THE published reports of research on natural estrogenic hormones and their esters are very conflicting with regard to potency and adequate dosages for clinical use. It seems that most of the difficulty in evaluating these substances for human use results from attempting to use biological effectiveness in laboratory animals as a criterion for effectiveness in the human being, without giving due consideration to species specificity.

Since the literature contains authentic reports of experiments with these estrogens in the human being, it seems desirable to study the available evidence in the various publications in an attempt to arrive at some definite conclusions.

INDICATIONS FOR THE USE OF ESTROGENIC HORMONES

Estrogens have been recommended to relieve a multiplicity of feminine ailments, including acne, sterility, vomiting of pregnancy, abortion, gonorrheal vaginitis in children, senile vaginitis, pruritus vulvæ, kraurosis vulvæ, and all types of menstrual disorders, and to relieve the subjective symptoms accompanying castration, ovarian hypofunction, the climacteric, and involutional melancholia. Estrogens are a valuable addition to the long list of preparations available for treatment in modern medicine. As with any other therapeutic agents, they have their limitations. They do not always relieve all of the conditions mentioned, and in some, it is a question whether they are indicated. There are some cases of sterility in which endocrine factors are not at fault, and even if the sterility is due to endocrine imbalance, there may be many other mitigating factors which might prevent successful results. Estrogens have been advocated for correction of the various types of menstrual disorders, such as primary and secondary amenorrhea, hypomenorrhea, oligomenorrhea, menorrhagia, metrorrhagia, and functional uterine bleeding. It is obvious to anyone who understands endocrine physiology and the anterior pituitary lobe, gonad, thyroid, and uterine interrelationship, besides other health-influencing factors, why treatment of these conditions is frequently so disappointing. The one group of conditions which invariably responds to estrogenic hormone therapy with gratifying results is the syndrome of subjective symptoms that accompanies castration, ovarian hypofunction, the climacteric, and involutional melancholia (18, 19).

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DIAGNOSIS

There probably are no other biological sciences so difficult to comprehend as biochemistry and physiology. The functions of the ductless glands and related structures involve the chemical and physical processes of life. To understand endocrinology, one must have a thorough knowledge of the following subjects: anatomy, both gross and microscopical; pathology; physiology, normal and pathological; chemistry; and biochemistry; besides this, one must be a good internist, know much of obstetrics and gynecology, be a fair psychiatrist, and have an abundance of clinical sense.

A thorough detailed history is of utmost importance and this cannot be of use unless one has knowledge of the sciences given above, supported by a broad understanding of clinical medicine and endocrine physiology. This must be followed by a complete physical examination and the necessary laboratory work upon which to base an opinion. Many patients are treated without having had an adequate minimum diagnostic survey upon which to arrive at reasonable conclusions. Various endocrine products are frequently administered in a haphazard manner. There are no substitutes for correct diagnosis and judgment based upon thorough clinical experience.

Additional aids for endocrine diagnosis are the various biological tests, such as hormone content of the blood and urine, changes in the vaginal smear, pH determination of the vaginal secretions, and examination of endometrial and vaginal tissue, obtained by curettage or the suction curette and the vaginal clip.

Some of these tests are not difficult to do and are inexpensive, while others, such as determination of the hormone content of the blood and urine, require the services of an expert technician and laboratory animals, and are expensive. Single tests of blood and urine are of no practical value,

but must be done in series over at least one or two menstrual cycles, which renders the cost prohibitive except for experimental purposes.

ESTROGENIC HORMONES

The principal natural estrogenic hormones that are clinically available in a crystalline state are estradiol (dihydroxyestrin, dihydrotheelin), estrone (ketohydroxyestrin, theelin), and estriol (trihydroxyestrin, theelol). Doisy and his coworkers (13) in 1935 reported the isolation of an ovarian follicular hormone (estradiol, dihydrotheelin) in crystalline form from the follicular fluid of pig's ovaries. Doisy and his coworkers (23) in 1938 reported that evidence indicates quite clearly that the principal ketonic estrogen of sow ovaries is theelin. The actual concentrations of theelin and dihydrotheelin per kilogram of sow ovaries are 20 rat units of theelin and 220 rat units of dihydrotheelin; this is equivalent to 0.010 mgm. of theelin and 0.014 mgm. of dihydrotheelin per kilogram.

Westerfeld and Doisy (22) found that when dihydrotheelin (estradiol) is injected into a normal adult, a castrate, or a castrate-hysterectomized monkey, from 30 to 45 per cent of the excreted estrogenic activity is ketonic (theelin, estrone). When theelin is injected into a normal adult, a castrate, or a castrate-hysterectomized monkey, from 30 to 50 per cent of the excreted estrogenic activity is non-ketonic (estradiol, dihydrotheelin). The evidence indicates that in the monkey the reaction between theelin (estrone) and dihydrotheelin (estradiol) is reversible and that the ovaries and uterus are not essential for this transformation.

Estradiol (dihydrotheelin) is not commercially available from ovarian tissues. It is identical with a reduction product which was made synthetically, and which is marketed under the names of progynon-DH; dimenformon and ovocylin. Another related compound is alpha-estradiol benzoate (progynon-B; dimenformon benzoate and ben-ovocylin).

The natural estrogenic hormones are steroids and they are closely related in chemical structure. There is another compound having marked estrogenic activity, which does not necessarily enter into the subject matter of this paper, but because of the attention which has been given to it in numerous publications recently, mention of it will be made here. In 1938, Dodds, Goldberg, Lawson, and Robinson (4) reported the synthesis of a new estrogenic agent, diethylstilbestrol. It does not contain the phenanthrene ring system, which is common to estrogenic steroids but has a nucleus containing two phenol rings joined by a carbon chain. Stilbestrol, while active estrogenically, especially orally, seems to be rather toxic when administered to human beings in a large percentage of patients (2, 12, 16, 25). Toxic symptoms include nausea, vomiting, cutaneous eruptions, and possibly liver damage.

METHODS OF ADMINISTRATION OF ESTROGENS

There are five methods of administration of estrogens; namely, oral, intramuscular, local, by inunction, and by implantation. Theelol (estriol) is said to be more active when given orally than is theelin (estrone). The intramuscular injection of estrogens is very satisfactory, especially when in solution in oil. The dosage absorbable is more accurately controlled in oil solution and the rate of absorption when in oil is slower and more prolonged, which produces constant stimulation. Local application is made by placing suppositories in the vagina. This probably is the best method for effect on the vaginal mucosa, especially in gonorrheal vaginitis. Estrogens are absorbable when applied to the skin in alcoholic solution and when incorporated in oil or an ointment base. This method seems rather inaccurate, in addition to placing these preparations in the hands of the public. Hormones are powerful biochemical agents and are capable of much harm to the patient if they are not needed, or if overdosages are given. Lay people are incapable of diagnosis and knowledge of therapeutics, and for their protection, hormones should be administered only under the personal supervision of a physician.

Deanesly and Parkes (3), in 1937, were the first to report the use of crystalline androgens and estrogens by subcutaneous implantation of crystals or pellets. This method has since been used in implanting pellets of androgens and estrogens in human beings, and desoxycorticosterone acetate for the treatment of Addison's disease (17). Several factors may influence the absorption rate, such as the surface area and the density of the pellet, vascularity of the implantation site, and the tissue reaction to a foreign body. Another problem to be considered is that there is no control of dosage, it being taken for granted that the body will utilize only what is needed, which is questionable. There is no reason to believe that only the necessary amount of hormone for normal function will be absorbed. If an excess amount of any substance capable of influencing body cells is present in the various tissues of the body, it seems reasonable to believe that hyperstimulatory effects may be produced. This is exactly what occurs when any gland hypersecretes, as in hyperthyroidism, hy-

perparathyroidism, hyperinsulinism and in hyperpituitarism (gigantism and acromegaly). The hormonal secretion of glands is not a continuous process of constant volume, but is subject to varying physiological demands, as for instance, the secretion of insulin, and adrenaline. There is another possible objection to implantation of crystalline estrogen pellets. It is known that the normal secretion of estrogen in the woman is cyclic. Implantation of estrogen pellets affords continuous absorption, and thereby prevents cyclic function. In other words, the implantation of crystalline hormones removes the possibility of control of the dosage.

That overdosage and absence of control of dosage may have grave consequences is proved by the reports of Ferrebee, Ragan, Atchley, and Loeb (7), and of Kuhlman and his coworkers (10), who had serious complications and untoward results in several patients following the use of desoxycorticosterone esters. Ferrebee, *et al.* (7) state, "extreme caution must be exercised in the administration of desoxycorticosterone esters because excessive amounts may lead to the development of hypoproteinemia, marked edema and cardiac insufficiency."

TESTS FOR ADEQUATE DOSAGE

The principal tests for adequate dosage of estrogens are, (1), clinical observation, (2) the vaginal smear test, and (3) biopsy of vaginal and endometrial tissue.

Observation based upon a knowledge of normal and abnormal conditions and syndromes plus clinical experience is of utmost value. The statements of castrate women, women having ovarian hypofunction (in the menacme), in the climacteric, and those with involutional melancholia, regarding relief of subjective symptoms is pleasing proof of adequate estrogenic dosage. The changes observed in patients, from intense subjective nervousness to calmness, from depression and crying to cheerfulness, from fatigue to normal vigor and endurance, absence of hot flushes, all are unmistakable signs of adequate treatment.

Papanicolaou and Shorr (14) in 1936 offered the vaginal smear test as a physiological criterion for the effectiveness of estrogenic treatment during the menopause. They showed that estrogenic treatment induces progressive changes in the vaginal epithelium that are comparable to the type observed in normal women during the follicular phase of the menstrual cycle. When the vaginal smear is changed from a leucocytic picture to cornification of squamous epithelial cells, treatment is considered adequate. However, in many cases symptomatic response occurs before the vaginal changes are complete.

Broun (21) who examined the vaginal smears from 16 castrate girls who were treated with theelin in oil over a period of thirty days states, "It is quite evident from the present study that changes in the vaginal secretion are a much less delicate index of the effectiveness of estrogenic material than is an examination of the uterine mucosa secured by curettage. In the smallest dosages employed the changes in the uterine mucosa were definite and striking. It is also quite obvious that symptomatic relief can be secured in dosages that are too small to produce definite changes in the vaginal secretion, since the group of subjects receiving the smallest dosage apparently secured as much relief of symptoms as those who received larger doses." Allen states (1), "We have found the relief of symptoms a more accurate guide to proper dosage than the changes in the vaginal smear."

Examination of endometrial tissue is another method of estimating effective estrogenic dosage. The most easily obtainable and dependable criterion of sufficient estrogenic dosage in the climacteric and related conditions is relief of subjective symptoms as expressed by the patient.

CLAIMS FOR POTENCY OF ESTROGENIC HORMONES

In the first report on the isolation of estradiol (dihydrotheelin) from pig's ovaries, Doisy and his coworkers (5) stated, "the new compound seems to be identical with a reduction product of theelin, which is called dihydrotheelin. It is from four to eight times as potent as theelin in adult castrate rats and approximately as active as theelol in immature rats. Other physiological tests must be run to establish the full range of activity of the new compound."

By some methods of assay various investigators have reported differences in potency between alpha-estradiol and theelin (estrone) ranging from 1:1 (11) and 5:1 (11) to 12:1 (24), which indicates the difficulty of arriving at uniform results as any of these may be used for argumentative purposes.

Whitman, Wintersteiner, and Schwenk (24), using the rat for assay of alpha-estradiol benzoate (progynon-B), estimated it to be twelve times as potent as estrone.

Laqueur (11), using both rats and mice as assay animals, reported (translation), "when the monobenzoate of dihydrofollicular hormone (progynon-B) was assayed by using rats, we found that the compound is five times more active than the standard preparation (ketohydroxy follicular hormone) (theelin, estrone); however, using mice

we found that the preparation has the same activity as the standard." Laqueur aptly states, "One cannot say anything about the therapeutic effect in human beings compared to folliculin" (theelin, estrone). (Parentheses by author.)

Parkes states (15), "The relation between one I. U. (international unit of free hormone) (theelin-estrone) and one I. B. U. (international benzoate unit) whether clinically or experimentally determined, must depend on the method of administration and the test object employed, and can have no general significance."

This is where the difficulty arises. It is theoretically possible that as many different comparisons may be shown as there are species of animals that may be used in the tests. The ultimate goal in endocrine therapy is effectiveness in the human being. That theelin (estrone) is equally or more active biologically than alpha-estradiol benzoate (progynon-B) in the human being, is indicated by a correlation of published research by different investigators.

RESEARCH IN THE HUMAN BEING

Kaufmann (8, 9) succeeded in preparing a premenstrual endometrium in a twenty-one-year-old girl by giving 210,000 mouse units of progynon benzoate (1,000,000 international units) over a period of twenty-one days, plus 5 Rb. U. of proluton for seven days. Kaufmann states (9), "In my first experiments I employed daily injections of oestrin benzoate, 1 c.c. of which contained 50,000 international units. All my later work was carried out with twice weekly injections of oestrin, 1 c.c. of which contained 250,000 international units. We owe this highly concentrated preparation to the researches of Schwenk and Hildebrandt, who showed that hydrogenation converts oestrin into a much more active derivative." In this same article, Kaufmann calls this new active derivative "dihydroxyoestrin," which is estradiol. He also reported treatment of primary and secondary amenorrhea, and of castrates and climacteric women for relief of symptoms with dosages ranging from 500,000 to 15,000,000 international units of estradiol.

Kaufmann (9), in summarizing research with estrogenic hormones states, "To repeat: My experiments showed that to reproduce a proliferation phase in the endometrium of a castrate woman on a single occasion, 1,000,000 international units of oestrin are necessary."

Werner and associates (20) produced the premenstrual endometrium in a castrate woman by intramuscular injection of 4,000 I. U. of theelin (estrone) in oil daily over a period of twenty-one days (total theelin 84,000 I. U.) during the last seven days of which 10 I. U. of progesterone in oil were injected daily (total progesterone—70 I. U.). This woman began to menstruate two days after cessation of the injections and flowed normally for five days.

Elden (6), in an experiment to produce the premenstrual endometrium and using alpha-estradiol benzoate (progynon-B) and proluton, summarized as follows: "A premenstrual endometrium could not be prepared in five castrated human females using 50,000 R. U. of estrin (250,000 international units) plus 12–60 Rb. U. of progestin. No premenstrual changes were noted when 30,000 R. U. of estrin and 12–14 Rb. U. of progestin were given. Bleeding can be induced in the castrated human female with 50,000 R. U. estrin (progynon-B) alone. It is not markedly delayed if estrin plus progestin is given. Bleeding can be produced with only 30,000 R. U. estrin if followed by 12–14 Rb. U. of progestin. Hot flushes are only temporarily relieved with estrin. When therapy is stopped the symptoms return in their original frequency and severity." In this article Elden states, "The estrin (Progynon-B) prepared from mare or stallion urine, was furnished by Schering Corporation. It contained 10,000 R. U. per c.c. (50,000 international units) in oil and was used throughout this study. Chemically it is the benzoic acid ester of dihydroxyoestrin."

Werner and his coworkers (21), using theelin (estrone) in oil (500 I. U. every third day for ten doses), found that it stimulates development of the sex related structures of the human female castrate, producing changes in the breasts, and gross appearance of the vagina, with increased mucous secretion and growth of the endometrium and vaginal mucosa following total dosages as low as 5,000 I. U. Definite changes in the vaginal smears were noted with total dosages of 10,000 I. U. theelin in oil (1,000 I. U. every third day for ten doses.)

Uterine bleeding lasting from three to seven days occurred five to six days after cessation of the injections with total dosages of 5,000 I. U. theelin in oil (500 I. U. every third day for ten doses).

According to the above experiments, theelin (estrone) is more potent in the human being than alpha-estradiol benzoate (progynon-B). The assay of estradiol and its compounds on the rat greatly magnifies their activity, because of the extreme sensitivity of the rat to these substances. This same degree of sensitivity to estradiol and its compounds is not present in the human being, nor even in the mouse.

Fig. 1. Atrophic endometrium of a castrate girl before treatment.

Fig. 2. Premenstrual endometrium produced in the same castrate girl by intramuscular injection of 4,000 international units of theelin (estrone) in oil daily for twenty-one days (total dosage 84,000 I. U.) plus 10 I. U. of progesterone daily during the last seven days (total progesterone—70 I. U.).

DISCUSSION

Much of the information obtainable from various publications and advertising literature regarding estrogenic potency and dosage is confusing to physicians. Claims for potency are made, based upon animal experimentation, especially the rat, and the effectiveness of International Units in the rat is noted. Obviously effective dosages of any substance used in the rat cannot be translated into effective dosages for the human being, any more than they can be in the case of the mouse.

The fallacy lies in trying to convert biological activity of the rat and mouse units by weight in animals into definite biological activity in the human being and at the same time ignore species specificity. To determine the average effective dosages in the human being, it is necessary to do experiments with estrogenic hormones in castrate women. This has been done by Kaufmann, with estradiol benzoate and alpha-estradiol benzoate: by Elden, with alpha-estradiol benzoate (progynon-B), and by Werner and associates, with theelin (estrone).

CONCLUSIONS

1. A comparison of published research indicates that theelin (estrone) is more potent than alpha-estradiol benzoate (progynon-B) in the human being.

2. A premenstrual endometrium was produced in a castrate woman by a total intramuscular injection of 84,000 International Units of theelin (estrone) in oil over a period of twenty-one days, during the last seven days of which a total of 70 I. U. of progesterone were injected.

3. Endometrial growth, cornification of the vaginal epithelium, and uterine bleeding occurred following a total intramuscular injection of 5,000 I. U. of theelin over a period amounting to thirty days.

4. Published research indicates that extremely large dosages of alpha-estradiol benzoate (progynon-B) are necessary to duplicate the effects of comparatively small dosages of theelin (estrone) in the human being.

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GYNECOLOGY

UTERUS

Lucchetti, G.: Traumatic Perforations of the Uterus (Le rotture traumatiche dell'utero). *Clin. ostet.*, 1940, 42: 314.

Traumatic perforation of the uterus, even if not very rare, is always an exceptional occurrence. Some of the cases are complicated by visceral lesions. In the last few years the increase in these cases has been due to the greater frequency of criminal attempts at abortion, and to the increased tendency toward laparotomy. Although many criminal perforations, especially if not complicated, are not medically reported, about 43 per cent of the cases are due to this cause.

The lesion is frequently at the bottom of the uterus, and in the isthmic region. For topographic reasons, the intestinal lesion can be taken care of more easily when a perforation of the isthmic region is present.

Perforation is more frequent in the lower part of the uterus when this is in a normal position, in the isthmic region in flexions, in the posterior part in antiflexions, and in the anterior part in retroflexions.

Abortive pincers (forceps) are used in the majority of cases of perforation, and often when the perforation is joined with visceral lesions. This result is due to the strong grip of which the pincers are capable. They grasp an intestinal loop, after the perforation of the uterus, and draw this through the perforation.

Visceral lesions are more frequently caused by doctors than by midwives or laymen, because, generally, Winter pincers (forceps) are used by doctors.

In criminal abortions the explanation may be found in the ignorance of those who perform this operation, but there are some cases in which the perforation occurs because of chronic metritis, chorioepithelioma, the menstrual period, cancer and other tumors, tuberculosis, senile marasmus, cardiac affections, and old scars after scrapings, pregnancy, and labor.

Lesions of both the large and small intestines are combined with the uterine perforation. They may vary from a simple decortication of the intestinal serous membrane, to the removal from the mesentery of a long section of the intestinal tube, or to the detachment and removal of a large portion of the mucous membrane.

In the uncomplicated cases, the symptoms are slight, pain is not intense and hemorrhage is negligible, while in cases complicated by visceral lesions symptoms are more marked. There may be acute pain accompanied by inflammation of the peritoneal region, distention of the abdomen, and vomiting. After a period of from twelve to forty-eight hours after the accident, the symptoms are aggravated because of the onset of peritonitis.

The mortality rate may be as high as 28 per cent, but there are many factors to be considered:

1. The site of the lesion—the lower part of the uterus is more dangerous.
2. The extension of the perforation, its size, and depth.
3. The kind of lesion, whether simple or complicated. Among the latter type the most usual is the intestinal lesion, which becomes more severe as it increases in size. The mortality is higher when the large intestine is involved than when the small intestine is involved.
4. The immediacy of the intervention is decisive: if operation is performed ten hours after the perforation the result may be favorable, while after twenty-four hours the outcome is very doubtful.
5. Sterilization of the instruments responsible for the perforation.
6. The condition of the interior organs and of the uterus at the time of perforation.

For simple perforations and for those not too extensive, a simple endo-uterine stopper is sufficient, such as ice on the abdomen and rest. For combined lesions, rapid intervention, exploratory laparotomy, suture of the uterus and of the intestine, or hysterectomy may be necessary; and in some cases drainage of the peritoneum, of the abdominal cavity, of the vaginal cavity, or of both the vaginal and abdominal cavities is required. NELDA CASSUTO.

ADNEXAL AND PERIUTERINE CONDITIONS

Wallis, O.: The Rôle of the Fallopian Tubes in the Spread of Pelvic Cancer. *Am. J. Obst. & Gynec.*, 1941, 41: 196.

The presence of free cancer particles in the normal fallopian tube may indicate the pathway of spread of pelvic cancer. A case is reported illustrating the spread of pelvic carcinoma by way of the fallopian tube. EDWARD L. CORNELL, M.D.

MISCELLANEOUS

Hoffmann, F., and Treite, P.: Comparative Investigations of the Action of Female and Male Sex Hormones and Suprarenal Cortex Hormones on the Uterus (Vergleichende Untersuchungen ueber die Wirkung von weiblichen und maennlichen Keimdruesenhormonen und von Nebennierenrindenhormonen auf den Uterus). *Zentralbl. f. Gynaek.*, 1940, p. 1603.

The authors castrated 12 rabbits, weighing from 500 to 800 gm., and eight days later treated them with from 0.75 to 4 gm. of progesterone daily for eight days. On the ninth day, they found that the uterus was enlarged and that the mucosa was in a secretory phase which, however, differed in some points from the transformation phase observed after

estrone and progesterone treatment. Hohlweg has confirmed these findings in his own experiments.

Enlargement of the uterus and growth of the mucosa without formation of scales in the vagina were also produced in immature, castrated mice with from 0.2 to 0.4 mgm. of progesterone alone given daily.

Under the same experimental conditions, the authors tested the influence of suprarenal-cortex hormone (desoxycorticosterone) on the uterus of immature, castrated rabbits and mice: 1 mgm. of cortiron had no effect, but from 5 to 10 mgm. daily led to enlargement of the uterus and to the appearance of a transformation phase in the endometrium of the rabbit. No scale formation was found in the mouse. Testosterone (from 1.5 to 10 mgm. daily) caused marked growth of the uterine mucosa and musculature.

The progesterone-like action of commercial preparations made from suprarenal cortex was observed in the Clauberg test (consequently, after preliminary treatment with estrone). It was found that complete transformation of the uterine mucosa could be obtained with 1.2 mgm. of cortenil (Bayer), with from 5 to 6 mgm. of percorten (Ciba), or with from 5 to 8 mgm. of cortiron (Schering): this corresponds to a progesterone action of 0.6 mgm. From this, the authors conclude that cortenil is contaminated with progesterone.

In the Clauberg test testosterone propionate showed no progesterone action, or at most a very slight one.

Therefore, in order to produce a transformation phase in the immature, castrated rabbit with progesterone alone, it is necessary to use from 60 to 80 times more progesterone than when the animal has first been treated with estrone. A pure growth action is caused in the uterus not only by estrone but also by testosterone, progesterone, and desoxycorticosterone, which are mentioned in decreasing order of their importance.

(Buettner). Richard Kemel, M.D.

Henriksen, E.: A Clinicopathological Investigation of the Causes of Menometrorrhagia. *Am. J. Obst. & Gynec.*, 1941, 41: 179.

A series of 1,500 women between the ages of twenty and forty years, complaining primarily of abnormal uterine bleeding, are presented from a clinicopathological approach. The misinterpretation of the endometrial patterns and the misapplication of terminology have done much to complicate the present status of investigative and therapeutic work in menstrual aberrations. Though endocrinopathic manifestations are important factors in the cause of abnormal uterine bleeding, factors of anatomical nature are more common and should be ruled out before the cause is interpreted as functional or dysfunctional in type. Therapy, to be adequate, demands a thorough and complete investigation of the entire system with a proper interpretation and appreciation of the findings. No attempt has been made to offer new theories, change the classification, or advance new ideas of therapy; the clinical aspects of the case and the associated tissue changes have been studied.

MAJOR FACTORS INTERPRETED AS THE CAUSES OF ABNORMAL BLEEDING IN 1,500 WOMEN BETWEEN THE AGES OF TWENTY AND FORTY YEARS, WITH THE PRIMARY COMPLAINT OF ABNORMAL UTERINE BLEEDING

The major factors	Numbers	Per cent of group	Per cent of series
Group A:			
Causes of bleeding unknown	197	27.0	13.1
Cervix, benign lesions	148	20.2	9.8
Myomas of the uteri	108	14.8	7.0
Ovary	76	10.4	5.0
Pelvic inflammatory disease	76	10.4	5.0
Cervix, malignant changes	57	7.8	3.8
Tubal gestation	27	3.7	1.8
Senile vaginitis	17	2.3	1.1
Endometriosis interna	16	2.2	1.1
Urethra	4	0.54	0.26
Rectum	3	0.4	0.2
Total	729		
Group B:			
Follicular phase	187	24.0	12.4
No changes; possible functional	124	16.0	8.2
Public	103	13.4	6.8
Endometrial polyp	102	13.2	6.8
Incomplete menstruation	82	10.6	5.4
Endometrial hypertrophy	70	9.1	4.6
Postabortal	53	6.9	3.5
Intermenstrual bleeding	33	4.3	2.2
General group	8	1.0	0.53
Postradiation	5	0.6	0.32
Tuberculosis	2	0.3	0.13
Abnormal gestation	2	0.3	0.13
Total	771		

Group A includes those cases in which either the specimen removed at surgery was obtained or the major factor was visualized or outlined by examination. Group B includes those cases in which the diagnosis was made with the aid of endometrial and/or cervical tissue.

Edward L. Cornell, M.D.

Kennedy, W. T.: Urinary Incontinence Relieved by Restoration and Maintenance of the Normal Position of the Urethra. *Am. J. Obst. & Gynec.*, 1941, 41: 16.

The normal urethra in its "voiding" state is pushed down with the vaginal wall into the vagina, its external meatus is pushed endwise out of the pelvis by varying distances up to 1 cm., and the sphincter muscle surrounding the inner third of the urethra dilates. A varying degree of the "voiding" state (which becomes permanent following relaxation or injury) is present when there is persistent incontinence; the greater the degree the greater is the incontinence. When there is no permanent dilatation of the inner third of the sphincter, the urethra may undergo excessive degrees of motion without any incontinence. However, persistent displacement may

in time permanently overstretch the inner third of the sphincter, in which case incontinence will develop.

The sphincter mechanism functions with its greatest efficiency when its greatest length is restored, when it is restored as far as possible within the pelvis and restored as high as possible above the vagina. To fulfill the restoration of the urethra it is first necessary to completely separate the urethra from all attachments to the vaginal wall and the rami, both of which, following injury, will hamper the function of the sphincter mechanism. After the urethra is completely freed, restoration of the sphincter mechanism can be satisfactorily accomplished by plication and replication of the under surface of the bladder and urethra.

The sphincter mechanism, unhampered by any lateral tractive forces after restoration, will perform its normal function. The sphincter mechanism probably requires no assistance of the levator muscle fibers, and the vaginal wall beneath the bladder and urethra is only a protective floor on which the bladder and urethra lie. Any factor such as infection or hematoma beneath the restored urethra may dissolve the plicating sutures and allow the urethra in whole or in part to resume some degree of the "voiding" state, and thereby produce a failure, and reoperation will be necessary. For success, restoration must be maintained bilaterally. Maintained restoration can best be accomplished by very free drainage of the paravesical spaces and open vaginal wall flaps.

The success of any incontinence operation will be measured by the fulfillment of the restoration herein described and the maintenance of that restoration.

EDWARD L. CORNELL, M.D.

Heynemann, T.: Genital Tuberculosis in the Female (Die weibliche Genitaltuberkulose). *Geburtsh. u. Frauenheilk.*, 1940, 2: 337.

In the entire world literature there is not one single absolutely proved case of primary genital tuberculosis. Nevertheless the possibility of its occurrence must be recognized. In 90 per cent of all the varieties of female genital tuberculosis the fallopian tubes are involved, and in 90 per cent of the tubal involvement the condition is bilateral; in about 25 per cent of the cases the tubal tuberculosis represents the only disease focus in the female genital tuberculosis. In only from 25 to 30 per cent of the cases of tubal tuberculosis is there a coincidental involvement of the ovary. In from 30 to 40 per cent of the cases of peritoneal tuberculosis there is also a tuberculosis of the tubes, and in about 50 per cent of the cases of female genital tuberculosis there is a coexisting peritoneal tuberculosis. However, a coincidental pulmonary tuberculosis is found in from 80 to 90 per cent of the cases of female genital tuberculosis. In the cases in which peritoneal tuberculosis and tubal tuberculosis exist simultaneously, it is possible that both of these conditions may have developed either hematogenically or lymphatogenically. It is possible for tubal tuberculosis to have its origin in the peritoneal tuberculosis and *vice versa*. Opinions still differ as to the frequency with which female genital tuberculosis, particularly tuberculosis of the tubes, may develop from a pre-existing peritoneal tuberculosis. The frequency of involvement of the tubes can be explained only by the assumption of a special susceptibility of the latter to tuberculosis. Next to the tubes, the endometrium becomes involved most frequently in female genital tuberculosis (well over 50 per cent of the cases), and in about 30 per cent of these cases the ovaries may develop tuberculosis. However, in 80 per cent of the cases of endometrial tuberculosis, there is also a coexisting tuberculosis of the tubes.

The primary infection with tuberculosis very frequently occurs during the age of childhood. Female genital tuberculosis may, therefore, develop soon thereafter, during the secondary or generalization stage of the tuberculosis, even during the age of childhood. And as a result of various conditions, endogenous reinfection may occur. It is generally recognized that this secondary endogenous development of female genital tuberculosis may easily develop from another tuberculous focus in the body. According to the opinion of the author, this etiology, because of its frequency of occurrence, is practically the only one leading to the development of female genital tuberculosis which comes into question. In addition to primary genital tuberculosis in the region of the vulva, vagina, and portio, it is possible that these regions may, even later in life, become the site of a tuberculous infection from without after a primary infection has already developed either in the respiratory passages or in the intestinal tract, especially during cohabitation (exogenous reinfection or superinfection). In the event of mixed infections the recognition of tuberculosis of the tubes is very difficult. From the point of view of pathological and anatomical researches, there are no recent results to be noted. The diagnosis must be established by means of histological examination. In the differential diagnosis, lues, actinomycosis, and foreign-body irritation must be excluded because they may produce similar changes.

The caseating exudative form is characterized by its rapid and destructive course, while the fibrous-tissue-producing form is characterized by the opposite. In every case in which there is a suspicion of tuberculosis, biopsy and histological examination should be performed. The diagnosis must never be made from the findings of palpation alone, but should be made on the basis of the accompanying symptoms and by the aid of special methods of examination. One may arrive at a sufficiently certain diagnosis by means of exploratory laparotomy and histological examination. The therapeutic effect of the exploratory laparotomy is entirely problematical. A prerequisite for the successful employment of the diagnostic cul-de-sac puncture is the mastering of the technique and animal inoculation. Only a positive result from the puncture is of significance. Should

the second examination of the material obtained on puncture yield a negative result, then the diagnosis of tuberculosis may be abandoned, especially if the serological test proof by means of the complement fixation has also yielded a negative result. An advantage of the serological determination of tuberculosis by means of the complement fixation and flocculation tests as compared to the tuberculin test lies in the fact that positive reactions of a nonspecific nature, or because of an arrested pulmonary tuberculosis are much more rarely seen. Complement and flocculation reactions in the blood have not always yielded a completely uniform reaction so that one is unable to say that the one method is preferable to the other. A positive result in inflammatory conditions of the female genitalia should always lead one to think of their possible tuberculous nature if this positive result cannot be explained by existing tuberculosis of the lungs or other organs. Absolutely positive proof, therefore, can be obtained only by animal inoculation, culture and histological examination, or laparotomy. In the case of a positive Aschheim-Zondek reaction in adnexal tumors one must also think of the possibility of an adnexal tuberculosis.

Curettage for the purpose of establishing the diagnosis of genital tuberculosis must absolutely be rejected. It is only quite exceptionally when all acute symptoms and signs are lacking, when the patient is completely afebrile, and after the failure of other diagnostic aids, that a very small curettage may be permitted. Any fragments of tissue which may be extruded from the uterus spontaneously should be examined histologically. Genital tuberculosis can be recognized and treated only on a purely clinical basis. The treatment is no longer an operative one, but should be basically conservative (climate and x-ray irradiation). The diet should be rich in vitamins, protein, and fat, and, as far as possible, free from salt and carbohydrates. The prognosis is made considerably worse by the presence of fistulas and as a result of operations carried out in the region of the diseased genitalia. There is no special prophylaxis against female genital tuberculosis; the treatment is closely related to the prophylaxis of tuberculous infection in any part of the body. In genital tuberculosis, sexual relations, the use of a condom, and douches immediately following intercourse are forbidden.

(H. Fuchs). Harry A. Salzmann, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Casabona, U.: Laboratory Investigations in Ectopic Pregnancy (Di alcune indagini di laboratorio nella gravidanza ectopica). *Folia demograph. gynaec.*, 1940, 37: 451.

The author emphasizes the difficulty of diagnosis in extra-uterine pregnancy and directs attention to the importance of accuracy of diagnosis in rational therapy. Of the various methods employed in diagnosing extra-uterine pregnancy, the biological reaction such as the Aschheim-Zondek test, the sedimentation rate of the erythrocytes, and the leucocyte count are probably most frequently used. However, it is well known that in some instances none of these procedures may be of value. In an attempt to evaluate their diagnostic significance a study of 42 cases of extra-uterine pregnancy has been made. The site of the tubal pregnancy was in the ampulla in 60 per cent of these cases, in the isthmus in 38 per cent, and in the interstitial part of the tube in 2 per cent. Laparotomy was done in 38 cases; in the rest some form of colpotomy or medical therapy was used.

The author briefly reviews the results of various investigators on the diagnostic significance of the Aschheim-Zondek reaction in extra-uterine pregnancy. He states that the majority of investigators agree that a positive Aschheim-Zondek reaction depends upon the vitality of the chorionic villi. The fact that this reaction is not as intense in ectopic pregnancy as in intra-uterine pregnancy is attributed to a deficiency in the development of the chorionic villi and to their early degeneration. The author presents a brief review of further studies on the significance of the Aschheim-Zondek reaction in ectopic pregnancy and its various complications.

In the cases studied by the author the Aschheim-Zondek reaction was considered 3 plus positive in 2 cases (5 per cent), 2 plus positive in 11 cases (26 per cent) (at least 3 hemorrhagic follicles in the rabbit's ovary), 1 plus positive in 7 cases (16 per cent), and negative in 23 cases (54 per cent). The author concludes from these studies (1) that the diagnostic significance of the reaction is undoubtedly important but the test should also be considered in the light of the clinical manifestation, and (2) that in the presence of the latter factor and a negative Aschheim-Zondek reaction it is probably better to rely more upon the clinical manifestations.

The author briefly reviews the literature on the significance of the sedimentation rate in ectopic pregnancy. The sedimentation rate was found to be low in 14 (35 per cent) of the 42 cases which he studied; it was found to be average (from 15 to 30 mm.) in 9 cases, and elevated in 5 cases. It was very much increased in 8 cases. In comparing the sedimentation rate with the biological reaction no direct or indirect relationship was observed.

A study of the leucocyte reaction in the author's cases revealed that in 5 cases a relative leucopenia (from 4,200 to 6,000) was present. A normal leucocyte count (from 6,000 to 9,000) was present in 16 cases and a marked leucocytosis in 12 cases. Leucocytosis was more consistently marked in the cases of ectopic pregnancy associated with rupture.

On the basis of these observations the author believes that the biological hormonal reaction, the sedimentation rate, and the leucocyte count represent tests which may be used in the diagnosis of extra-uterine pregnancy. After briefly discussing these various factors in extra-uterine pregnancy and its complications, he concludes that they are of some diagnostic value when used in association with clinical manifestations. MICHAEL DEBAKEY, M.D.

Pignoli, R.: The Existence of a Capsular Membrane in Tubal Pregnancy (Sulla esistenza di una membrana capsulare nella gravidanza tubarica). *Ginecologia*, Torino, 1940, 6: 443.

The question of whether there is a decidual or capsular membrane in tubal pregnancy has never been absolutely settled. Up until 1871 it was assumed that there was no true reflex decidua in tubal pregnancy such as there is in uterine pregnancy, but in that year Winckel reported a case in which there was anatomical evidence of such a decidua. After that, various authors published articles arguing for or against his findings. These articles are reviewed briefly, and the author describes 2 cases of his own which seem to him to prove that there is a membrane analogous to the uterine decidua in tubal pregnancy. Although he has made histological examinations of many tubes in which pregnancy existed he has found only these 2 in which there was decided evidence of a decidual membrane. However, he calls this a capsular, rather than a decidual, membrane, a name which has been suggested as not fixing absolutely the nature of the membrane. Cova and others have held that the membrane which envelops the tubal ovum is simply a continuation of the tubal mucosa and does not show any active decidual reaction.

The author gives photomicrographs of the findings in his 2 cases. They show a membrane which is analogous to that of the uterine decidua. He believes that the morphogenesis of this membrane is the same as that of the uterine decidua but its later development is different. It is too inelastic and has not sufficient proliferative capacity to go on developing as the uterine decidua does and so degenerates and finally ruptures at some point and allows the blood to escape into the tube; and if that is permeable, the blood flows into the peritoneal cavity and terminates the tubal pregnancy in this way. However, in these cases, particularly the second one, there were cells of an epithelioid type, definitely differentiable from

Langhans' cells, which had an appearance strikingly like that of true decidual cells, and the author believes that there was a true, though weak, decidual reaction. AUDREY G. MORGAN, M.D.

Albers, H.: Pregnancy Edema (Das Schwangerschaftsoedem). *Therap. d. Gegenw.*, 1940, 81: 382.

The edema of pregnancy and the edema of renal disease are not identical and therefore must be considered and treated separately. The same is true also, of course, of edemas which are in no way related to pregnancy, as for instance that accompanying decompensated cardiac deficiency. It is necessary to make a clear differential diagnosis between renal disease and the toxicoses of pregnancy. Genuine nephritis may be distinguished by the increased residual nitrogen. The pictures of nephrosis and of pregnancy toxicosis (which has also been classified as a nephropathy) are similar but the edema fluid of nephrosis contains little or no protein, whereas that of toxicosis contains protein, often in considerable quantity. Also the radium index in nephrosis is far above 20 mgm. per cent whereas that of toxicosis is constantly below 20 mgm. per cent. An existing nephrosis or nephritis is frequently an indication for the interruption of pregnancy, whereas toxicosis responds favorably to treatment.

The edema of the ankles in pregnant women is predominantly a static edema. The tendency toward edema in pregnancy is due to the acidification accompanying the increased metabolism, which is associated with a discharge of sodium from the blood into the tissues, and thus leads to increased osmotic pressure and water-binding capacity with a corresponding increase in the cellular protein passing from the vascular system into the tissues. Moreover, the vascular system is more permeable to fluid and protein in pregnant women. Likewise, the increase in venous pressure during pregnancy and labor forces about ¾ of a liter of fluid from the vascular system. Thus, the tendency to edema is furthered by increased vascular permeability, increased filtration pressure, a lowered water-binding capacity of the serum, the hydrophile power of the tissues, and the increased saturability of the tissue proteins due to the increased sodium in the tissues.

The investigations of the author have shown that the blood volume in pregnancy edema is not increased by about 1 liter as in normal pregnancy, but decreased by about ½ liter in the nature of a concentration of the blood. On the second and fourth day after delivery, a retrograde flow of water from the tissues into the vascular system occurs shortly preceding diuresis, so that one might speak of a prediuretic plethora of the plasma.

From this knowledge of pregnancy edema, the beginnings of which are already present in the normal physiological state, a therapeutic attempt to influence metabolism is indicated. It is possible to dehydrate an edematous pregnant patient or an eclamptic patient even shortly before delivery by means of a raw vegetarian diet. A weekly diet plan is presented. Its effect is attributed to the dehydrating action of potassium.

(FRANKEN). EDITH SCHANCHE MOORE.

Sheehan, H. L., and Sutherland, A. M.: The Pathology of Heart Disease in Pregnancy. *J. Obst. & Gynaec. Brit. Emp.*, 1940, 47: 597.

An analysis was made of the clinical and pathological findings in 108 obstetrical patients who showed acute or chronic lesions of the heart valves at autopsy. These were compared with the autopsy findings of 215 non-pregnant women of child-bearing age who had similar valve lesions, and of 705 obstetrical patients with normal valves. The following conclusions were drawn:

Chronic rheumatic valvular disease was present in 1.5 per cent of all obstetrical patients in this locality (Glasgow). The mitral and aortic valves were involved with about the same frequency as in women not pregnant, but tricuspid lesions were found at autopsy much less commonly than in women not pregnant. The clinical diagnosis of particular chronic valve lesions was much better when heart symptoms were present than when they were not present, but a correct diagnosis was made in less than half of the cases. The difficulties in clinical diagnosis make it impossible to place full reliance on studies based on clinical data alone.

The mortality in women with chronic valve lesions was 6.3 per cent, 0.9 being due to superimposed ulcerative endocarditis, 2.9 per cent to other cardiac causes, and 2.5 per cent to complications not involving the heart.

Nearly half the patients had had some evidence of congestive failure. This was related to the type of valve lesion, severe mitral stenosis and mitral stenosis combined with aortic stenosis being the most serious, while incompetence of the valves was of less significance. The degree of hypertrophy of the heart did not appear to be an important factor in decompensation.

Deaths during or immediately after labor are usually *not* due to the progressive exhaustion of a badly decompensated heart, but are in most cases catastrophic acute heart failures in patients who have either not been decompensated or only slightly decompensated. Such acute heart failures are not satisfactorily described as acute pulmonary edema, because the lungs are edematous at autopsy in nearly all patients suffering from heart disease.

The deaths during pregnancy or the late puerperium are several times as common as in patients not pregnant.

While many patients have never had congestive failure before, a patient whose heart decompensates in a pregnancy will usually have the same condition in subsequent pregnancies.

The American Heart Association Classification is of some value when it is based on the patient's condition in the last quarter of pregnancy, but it is not of help in assessing the prognosis before this stage of pregnancy.

The belief that decompensation of the heart is related to myocarditis or acute pancarditis does not rest on a satisfactory basis, but simple recurrent endocarditis superimposed on chronic valve lesions shows a much higher incidence in pregnant women than in the non-pregnant and in those with decompensation than in those without it. The reason for the high incidence in obstetrical cases is obscure, but the recurrence appears to develop in the course of pregnancy and not in the puerperium. Recurrent endocarditis cannot be diagnosed satisfactorily during life except by inference. It is an important complication of chronic valve lesions.

Simple acute endocarditis occurs in pregnancy with about the same frequency as in women not pregnant, and does not present special features.

Ulcerative endocarditis superimposed on chronic valve lesions and subacute bacterial endocarditis are more common in pregnant women than in the non-pregnant. These conditions develop during the pregnancy and not in the puerperium. They may be based on recurrent endocarditis. They lead to a severe type of decompensation.

Primary ulcerative endocarditis without a previous chronic valve lesion is much less common in pregnant women than in women not pregnant.

A patient who has any kind of valve lesion—chronic, recurrent, acute, or ulcerative—may also have pyelonephritis, hypertensive toxemia, eclampsia, or puerperal sepsis, but these diseases do not have any relation to the valve lesion, either as cause or effect.

Deaths associated with congenital heart disease, cardiac neurosis, or syphilis or primary sclerosis of the aortic valve are rare. DANIEL G. MORTON, M.D.

MISCELLANEOUS

Stieve, H.: The Flow of Blood Out of the Intervillous Space of the Human Placenta (Ueber den Abfluss des Blutes aus dem intervilloesen Raum der menschlichen Placenta). *Zentralbl. f. Gynaek.*, 1940, p. 1570.

Examinations were conducted upon 154 human uteri during all the months of pregnancy from beginning to term. As they were made on organs obtained by operative removal, the preparations were so fresh that all histological details were quite clear. The conditions of the cervical parts, the isthmus, and the musculature were examined as well as the development, the construction, and the relations of the placenta. The work forms a continuation of that reported in publications of 1935 and 1936.

The results of the examinations can be shortly summarized as follows:

Venous blood flows out of the intervillous space into the reaches of all parts of the human placenta. In the veins which drain the intervillous spaces, one finds especial arrangements in the form of valves and muscle-pads which function in such a manner as to direct the bloodstream from the placenta toward the heart. The arrangement of the cotyledons shows plainly that Spanner's theory regarding the blood circulation in the placenta is false. If his theory, that the venous blood flows out only in the vicinity of the marginal sinus and a 2½ cm. marginal zone, were correct, then the septa in all of the cotyledons which are in connection with the marginal zone or lie in its range could not have the significance which he attributes to them.

(H. SIEGMUND). FRANK MCDOWELL, M.D.

Giuffrida, S.: Transabdominal Puncture of the Uterus for the Diagnosis of Hydatidiform Mole (La puntura transaddominale dell'utero per la diagnosi di mola vescicolare). *Clin. ostet.*, 1940, 42: 249.

The hydatidiform mole very seldom betrays itself by the expulsion of vesicles, which is its pathognomonic symptom, and neither the quantitative evaluation of prolan in the urine nor x-ray examination, nor both of them combined give decisive results.

A new method of diagnosis was introduced by the French gynecologist, Aburel, who makes a transabdominal puncture of the uterus. Before operation the urinary bladder must be emptied, the skin disinfected, and the exact outline of the uterus determined. Local anesthesia is required. The walls of the abdomen and of the uterus are brought in close contact and a lumbar-puncture needle with a mandrin is introduced perpendicularly into the uterus.

If the needle's point is introduced into the cavity of a normal pregnant uterus, the fluid drawn out by means of a syringe will be amniotic liquor, whereas in the case of a hydatidiform mole more or less red blood will be withdrawn.

The author, agreeing with Aburel on the value of this method, employed it in 6 cases. In the first there was question of a five-month pregnancy—the woman was suffering from hemorrhage since the third month. There was no excessive excretion of prolan, and x-ray examination gave uncertain findings. By transabdominal puncture no amniotic liquor could be withdrawn, only blood. The diagnosis of a hydatidiform mole was confirmed by emptying the uterus; the mole weighed 800 gm.

The second case was that of a woman who was pregnant for the fifth time. The volume of the uterus corresponded to a pregnancy of the sixth month, but no fetus could be felt and no cardiac beats could be heard, although the woman asserted that she had felt movements of the child. There was an increased amount of prolan in the urine. X-ray examination without the use of a contrasting substance proved unsatisfactory. By transabdominal puncture pure blood was extracted. The woman left the hospital before undergoing the suggested operation; later, however, she spontaneously delivered a large mole.

The diagnosis was especially difficult in the third case. A pregnancy was indicated by the growing size of the uterus and incessant vomiting. Cardiac beats could not be felt. The prolan test was positive, but in transabdominal puncture the uterus reacted as a

"pumpkin" and no liquid could be extracted. Septic inflammation with spontaneous rupture of the uterus was eventually discovered at autopsy.

In the fourth case the positive result of the prolan-reaction suggested a mole, but the transabdominal puncture yielded pure amniotic liquor. Further development confirmed the existence of a normal pregnancy.

No details were given about Case 5.

Case 6 offered particular difficulties but pure blood was obtained by transabdominal puncture of a mole; there was, however, a question of abortion in a bipartite uterus with the needle having struck the septum.

According to the author, transabdominal puncture of the uterus is a safe method for diagnosis if done by a skilled gynecologist. Though it cannot be expected to solve the diagnostic problem in all cases, it may be of decisive value when other diagnostic means have failed. NELDA CASSUTO.

Page, E. W., Patton, H. S., and Ogden, E.: The Effect of Pregnancy on Experimental Hypertension. *Am. J. Obst. & Gynec.*, 1941, 41: 53.

To shed light on factors possibly concerned with the unfavorable influence of pregnancy upon human hypertension, rats and rabbits with experimental hypertension were studied during pregnancy or in pseudopregnancy with deciduomas.

Blood pressures were measured in rats by the tail plethysmograph, and in rabbits by the ear-capsule method. Hypertension was induced by partial ligation of the renal arteries, or, in some rats, by painting one kidney with collodion and removing the opposite kidney later. Deciduomas were induced by placing silk threads in the uterine mucosa during pseudopregnancy.

During pregnancy in normal rabbits, the changes in blood pressure as shown by these methods were negligible. Renal ischemia produced during pregnancy was followed by hypertension, but the onset was delayed until after delivery. Pregnancy produced an early fall in the blood pressure in all of 10 hypertensive rats, and a less constant fall in 12 hypertensive rabbits. No untoward effects were observed. An increase of protein content in the diet caused sickness or death in hypertensive non-pregnant rabbits. Pseudopregnancy with deciduoma in all of 11 hypertensive rats caused a decline in the blood pressure corresponding roughly in time and extent to that caused by pregnancy.

These findings suggest that the fall in blood pressure observed results more likely from endocrine changes than from any action of the fetal kidney. Doubt is thrown on the concept that a "load on the maternal kidneys" plays a significant part in the exacerbation of hypertension usually observed in human pregnancy. EDWARD L. CORNELL, M.D.

GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Barney, J. D., and Jones, G. E.: Some Problems in the Management of Urinary Calculi. *J. Urol.*, 1941, 45: 1.

Certain problems in the management of urinary calculi and some phases of the recent progress made are discussed by Barney and Jones.

Early claims that Vitamin A deficiency is an important factor in stone formation have not been substantiated in the human being.

Dietary factors are of very real importance. In a group of proved cases of urinary lithiasis, 39 per cent of the patients had consumed excessive amounts of milk, cheese, or alkalies for a long period of time. Such individuals develop phosphatic calculi. In certain metabolic disturbances, as gout and cystinuria, stones may be formed. One of the most important of these disturbances is hyperparathyroidism. In 3 or 4 per cent of the authors' series of cases calcinuria induced by hyperparathyroid disease was present. Certain drugs used either as acidifying agents or antiseptics, such as ammonium chloride or nitrohydrochloric acid, may also produce an excessive calcinuria.

Persons bedridden for fractures may show decalcification of the skeletal structures with excessive calcinuria. Added to this is the factor of stasis.

Urinary-tract infection, especially with the urea-splitting organisms, are of special significance. Certain organisms such as the bacillus influenzæ, the staphylococcus, the streptococcus, and the bacillus pyocyaneus seem to have a selective affinity for invading the parenchyma of the kidney. These strains which invade the parenchyma are practically always "urea splitters." On the other hand, the bacillus coli (urea-splitting strains), the bacillus proteus, and, occasionally, the staphylococcus and the streptococcus produce stones in the pelvis or calyces.

Of the cases which form the basis of this discussion, 46 per cent were infected with urea-splitting organisms.

Certain steps are outlined as of especial importance in the management of patients with urinary calculi:

1. The dietary habits, especially in regard to food rich in calcium, must be ascertained.

2. Careful and repeated cultures of the urine must be made.

3. The calcium content of the urine must be determined. A simple, easy laboratory test is presented.

4. If a stone or stone fragment can be obtained, it should be subjected to careful chemical analysis. This is of value in establishing the etiological factor and in indicating what diet restrictions are to be made, and whether an alkali or acid regime is to be recommended.

5. Roentgenograms should be made, not only to indicate size, position, and number of stones, but also because the nature of the stone is at times revealed.

The prognosis depends upon many different factors and varies with the etiology in each instance, and the type of infection.

Some new phases in the treatment of urinary lithiasis are considered. Operative and manipulative treatment are not discussed as the indications are so well known.

The medical treatment consists of proper dietary measures. In addition, the urinary-tract infection is relieved by proper therapy. The difficulties and dangers of acidifying the urine are discussed.

Fluids should be pushed to the point of tolerance.

The value of the modern antiseptics under proper conditions is pointed out. A new therapy—dissolution of the stone—which has been successful in a few instances is mentioned.

The importance and value of a stone clinic, both to the patient and to the surgeon, is emphasized.

ANDREW MCNALLY, M.D.

Uhle, C. A. W.: The Significance of Aneurysm of the Abdominal Aorta Masquerading as Primary Urological Disease. Case Reports. *J. Urol.*, 1941, 45: 13.

Experience with 5 cases of aneurysm of the abdominal aorta masquerading as disease in the urological tract is recorded. Errors in the diagnosis and unnecessary exploratory operations are due to insufficient attention to details in the clinical history and incomplete roentgen interpretation.

Urological complaints of a similar but milder type usually have been present for a number of weeks or months. Pain is the chief symptom and usually results from a combination of factors; these are (1) displacement of the kidney and ureter by the ruptured or unruptured sac, (2) hemorrhage into the perirenal space, (3) erosion of the vertebral bodies, and (4) pressure on the nerve root. The pain is more intense and less effectively relieved by sedatives than that due to primary urological disease. The pain is commonly referred to the testis, lumbosacral area, hip, thigh, and foot. Pain of a boring or piercing quality indicates bone erosion or pressure on the nerve root. Similar gastro-intestinal manifestations are found.

Physical examination often fails to reveal the aneurysm, if made early or if the aneurysm is located in the upper part of the abdominal aorta. When the sac ruptures into the retroperitoneal area, death may occur within a few hours or may be delayed for days or weeks. When small losses of blood occur at intervals the pain may simulate renal colic.

The urological manifestations of the dissecting type of aneurysm are the most acute. Hematuria and

Fig. 1. Syphilitic saccular aneurysm of the upper abdominal aorta simulating left perinephric abscess; slow perforation. Note upward displacement of the kidney, change of renal axis to perpendicular, mesial deflection of the ureter, deflection of the vertebral column toward the left side. Lateral view failed to show erosion of the vertebræ, although erosion was found at autopsy.

anuria from parenchymal damage is more often encountered in this type. If rupture into the loin occurs and death is delayed, calculus, tumor, or abscess can be simulated.

X-ray examination is of utmost value in making the diagnosis. The lateral or oblique view of the vertebral column showing erosive cupping is of great importance, and no examination of the abdomen when aneurysm is suspected is complete without it. Retrograde urography will reveal the anatomical changes in the urinary tract.

In the surgical treatment, wiring of the sac if unruptured is of distinct value in the amelioration of symptoms. If a lumbar surgical approach is employed on account of suspected urological disease, and a bluish mass is seen in the perinephric space, it would be fatal to open it.

Exploratory operations are condemned.

ANDREW MCNALLY, M.D.

BLADDER, URETHRA, AND PENIS

Anselmino, K. J.: Operative Restoration of a Large Defect of the Bladder Base, Bladder Neck, and Urethra (Operative Wiederherstellung eines Riesendefektes von Blasenboden, Blasenhals, und Harnroehre). *Zentralbl. f. Gynaek.*, 1940, p. 1175.

A forty-one-year-old woman had undergone 3 normal births. On May 17, 1934, termination of the fourth birth was accomplished by means of a high forceps. A vesicovaginal fistula has persisted since that time. As many as 4 operations have proved ineffective. Then in July, 1939, the woman came to the State Women's Clinic presenting the following findings: defects in the base of the bladder, the bladder neck, and urethra. There was a vesicovaginal fistula about the size of a tablespoon with a prolapse of the bladder resembling tumors of the size of a small apple which extended out of the broad anterior vaginal wall. The first operation was carried out at the clinic on July 21, 1937, at which time the bladder fistula was closed by means of extensive mobilization and the uterus was interposed. The result was favorable to the extent that the capacity of the bladder amounted to 200 c.cm. and the patient remained comfortably dry. The vesicle opening was restored by means of an especially well constructed ostium of mucous membrane. The bladder neck and urethra were still unsatisfactory. At the second operation on March 15, 1938, the bladder neck was restored by means of a purse-string suture around the perivesical tissues of the bladder neck, and a functional and anatomical result was secured, through a shelf of fat tissue in the bulbocavernosus. Moreover, a portion of urethra was constructed. Although the patient showed no incontinence and managed to continue walking for three hours without losing any urine, yet there was a third and last operation on October 13, 1938, undertaken both because of the short and thin membranous fore portion of the urethra and her bladder complaints. The urethra was completely restored by the execution at the same time of a plastic operation on the bulbocavernosus and a perineorrhaphy. The final result was excellent. The urethral meatus was correctly situated and the urethra was about 3 cm. in length. Complete continence was obtained. The perineum was well supported and high. There remained only mild bladder complaints. Up until March, 1940, it was possible to observe the satisfactory condition of the patient and she herself regarded the resultant condition as a complete cure. The success was obtained mainly through the employment of tissues for reconstruction which were taken from the vicinity of the bladder with interposition of the uterus and support by means of lipomuscular tissue from both labia).

(HANS HEIDLER). H. H. GROSKLOSS, M.D.

Councill, W. A.: A New Technique for Diverticulectomy of the Bladder. *J. Urol.*, 1941, 45: 382.

It is the purpose of this article to describe a new operative technique for diverticulum of the urinary

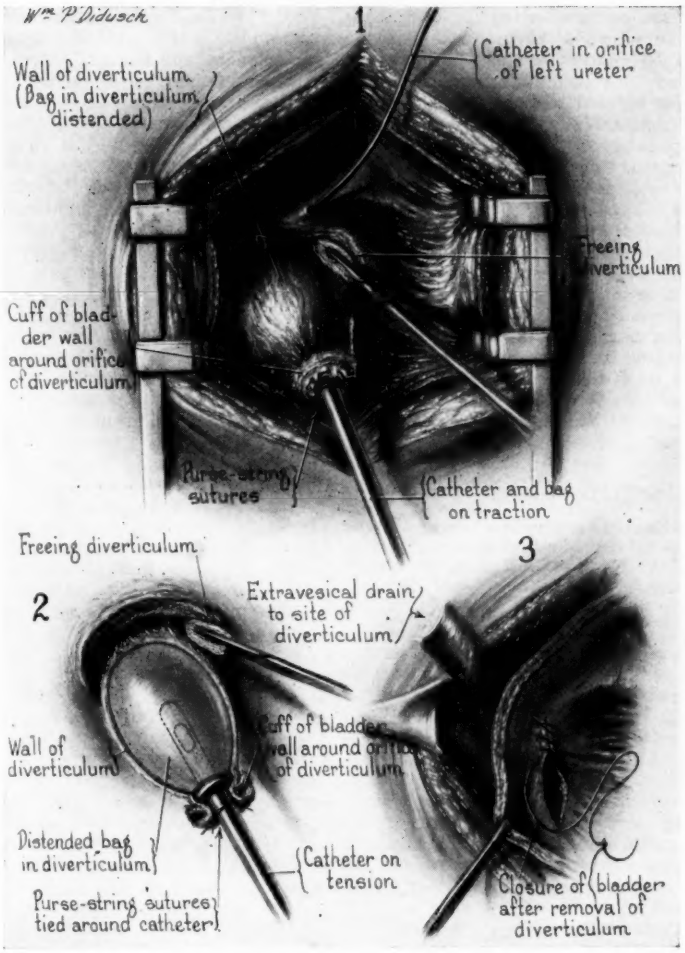
Wm. P. Didusch
1
Wall of diverticulum (Bag in diverticulum distended)
Catheter in orifice of left ureter
Freeing diverticulum
Cuff of bladder wall around orifice of diverticulum
Purse-string sutures
Catheter and bag on traction
Freeing diverticulum
2
Extravesical drain to site of diverticulum
3
Wall of diverticulum
Cuff of bladder wall around orifice of diverticulum
Distended bag in diverticulum
Catheter on tension
Purse-string sutures tied around catheter
Closure of bladder after removal of diverticulum

Fig. 1. Diverticulectomy. *1*, Freeing diverticulum by blunt dissection. Traction maintained on catheter attached to bag. Distended bag outlines diverticulum and helps to maintain proper line of cleavage between wall of diverticulum and surrounding tissues. *2*, Sectional view shows distended bag filling diverticulum and method of holding bag in diverticulum by means of purse-string sutures at orifice. *3*, Extravesical drain placed down to site of diverticulum. Suture of defect in bladder wall after removal of diverticulum.

bladder and to report a preliminary case. The technique is executed intravesically with the aid of a rubber balloon which envelops the end of a urethral catheter. The balloon may be made from finger cots, the fingers of a rubber glove, or from a special thread, gut, or a rubber band which is reinforced with rubber tape. The balloon is inflated with an ordinary atomizer bulb. Cystograms should always be made to predetermine the size and type of balloon used.

The usual suprapubic approach is made to the bladder; the peritoneum is reflected, and the bladder is opened and held with Young's self-retaining retractor. One or both ureters are catheterized if necessary, and the diverticulum is located. The balloon-tipped end is introduced into the sac partly inflated and the catheter clamped. A purse-string suture of No. 1 plain catgut is taken around the orifice, tightly tied to the catheter, and retied on the

opposite side. A second purse-string suture running in the opposite direction is taken and tied in the same manner. This holds the balloon firmly in the diverticulum, and thus facilitates dissection. The balloon is further inflated to fit the diverticulum snugly, and the catheter is clamped at the distal end. An incision is made through the mucous and submucous coats 0.5 cm. from the purse-string sutures and, after encircling same, the resection is carried out distal to the inflated balloon, the catheter being used as a tractor. After excision of the sac, a Penrose drain is carried down to the cavity extravesically and then brought out through a stab wound laterally. The opening in the bladder is closed with continuous No. 1 plain gut, and a Pezzer catheter is left in place for suprapubic drainage. The bladder is closed with continuous No. 1 chromic catgut, and the muscles and fascia are closed with interrupted No. 2 chromic catgut. A small drain is left in the space of Retzius and the skin closed with interrupted black silk. JOHN A. LOEF, M.D.

GENITAL ORGANS

Silla, T.: Fifty Cases of Incomplete Descent of the Testicle Treated by Hormones (Su cinquanta casi di discesa incompleta del testicolo trattati con cura ormonica). *Policlin.*, Rome, 1940, 47: sez. prat. 1456.

The results of orchidopexy in the treatment of cryptorchidism are not always brilliant. Researches on hormones have demonstrated their effect on the testicles and the efficacy of medical treatment when they are undescended. A correlation has been noted between the pituitary gland and the gonads. Careful examination of the patients has shown various clinical manifestations of pituitary deficiency and in some also thyroid deficiency. Schlos and Giauni claim that the descent of the testicles in intra-uterine life is due to the pituitary hormones in the mother's blood, as well as placental hormones of a pituitary type. The deficiency in such hormones during intra-uterine life is the cause of cryptorchidism.

Aschheim and Zondek have demonstrated the marked influence of the extract of the anterior lobe of the hypophysis on sexual development. Aschner in 1912 demonstrated that ablation of the hypophysis is followed by atrophy of the sex glands. In 1920 Hirosa demonstrated a sex gland-stimulating hormone in the placenta, and in 1926 Aschner demonstrated this hormone in the urine of pregnant women.

It is accepted by most authors that the pituitary gland produces two hormones which stimulate the gonads: an acid extract soluble in water, prolan A, and an alkaline hormone insoluble in water, prolan B. The extracts of the placenta and of the urine of pregnancy are analogous to the hormones of the hypophysis. Of these hormones, prolan A has no effect on the male sex organs; prolan B stimulates the growth and descent of the testes. Schapiro in 1930 was the first to cure cryptorchidism in man by the use of prolan. These results have since been confirmed by numerous authors.

In 207 cases (67 per cent) of a series of 306 of cryptorchidism studied in the literature the author found that complete or incomplete cure had occurred. The age of the cured patients varied from two to twenty-one years. The total dose used for cure varied from 700 to 100,000 rat units.

The author then presents his own series of 50 cases treated with prolan. The entire group is presented in tabulated form showing the age of the patient, the position of the testicles, the total dose used, the results obtained, and the individual comments. Complete cure resulted in 29 cases (58 per cent) of this series, incomplete cure resulted in 17 cases, and no improvement was obtained in 4 cases. In the successful cases the testicles increased in volume and the general condition of the patient, including the psychic reactions, improved.

JACOB E. KLEIN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Vogt, J. H.: Therapeutic Measures in Osteomalacia and the Control of Their Efficiency. *Acta med. Scand.*, 1941, 106: 16.

A very advanced case and a case of beginning osteomalacia are reported. In both the cause seemed partly to be inadequate nourishment, principally a deficiency in milk and in Vitamin D. Further pathogenetic factors were an insufficient production of hydrochloric acid, a chronic gastro-enteritis (in the first case a resection of the ventricle had been made), and an increased fat content of the feces.

In the first case it proved sufficient to give 200 gm. of milk daily and 4,500 international units of Vitamin D. In the second case 1,000 gm. of milk and the same quantity of Vitamin D did not prove sufficient. A satisfactory therapeutic result was obtained by giving 12,500 international units of Vitamin D and a large supply of secondary calcium phosphate. The use of this salt is recommended as it contains equimolecular amounts of calcium and phosphorus and is not so insoluble as the tertiary salt. The use of organic calcium salts is rejected for various reasons. Also hydrochloric acid was used because it probably aids the resorption of calcium.

As to the control of the therapeutic measures, x-ray examination is not sufficient as this method can reveal only grosser changes in the mineral content of the bones, and such changes cannot be expected in the first months. The use of balance experiments is recommended as such experiments can be carried out in the usual medical department on the condition that the content of calcium and phosphorus in the food is taken from tables. Repeated serum analyses may yield some information. The possibility of direct analysis of the skeleton by sternal trepanation is mentioned.

Brandis, H. J. von: Subcutaneous Muscle Tears (Ueber subcutane Muskelrisse). *Deutsche Ztschr. f. Chir.*, 1940, 253: 639.

The subcutaneous rupture of muscles rarely occurs from direct trauma. As a rule, it is brought about indirectly, often during athletic contests or training, especially if there is disproportion between capacity and taxation of the muscular tissue. Fundamentally, every skeletal muscle can be ruptured, but the frequency of this accident in a given muscle or group of muscles is different and depends on the amount of strain. In the extremities the muscles with strong bellies and relatively short tendons are especially liable to rupture, due to their strong and rapid contractions.

Within the last ten years 14 cases of ruptured muscles have been treated, 9 of which involved the biceps brachii and its long tendon; 2 involved the extensor muscles of the thigh; and 3 the calf musculature and the Achilles tendon. Furthermore, some tears in the adductor muscles, in the extensor muscles of the thigh, and in the calf musculature have been observed, all of which were treated without hospitalization and were not included in this article. There were no sport injuries among the cases. In 4 cases a direct blow upon the muscle was stated to be the cause of the rupture; in the other cases the ruptures were caused by indirect violence. Most patients were between sixty and seventy years old. A man aged forty-seven had suffered 4 ruptures of muscles in different places and at different times. Without doubt his muscle tissues had been damaged by previous infections. Among the 14 cases there were 13 males.

The clinical picture is discussed thoroughly in accordance with the case histories. Smaller tears were treated conservatively without hospitalization. In 7 cases boric-acid ointment and alcohol dressings were employed with good results. Larger ruptures were sutured (3 cases). If suture was impossible, the ruptures were treated by the "skinplastik" method according to Rehn. Great care was taken to restore the function, and good results were obtained in all of the patients.

(Bode). Jerome G. Finder, M.D.

Siegling, J. A.: Growth of the Epiphyses. *J. Bone & Joint Surg.*, 1941, 23: 23.

It is generally accepted that growth of the diaphysis occurs at the cartilage columns in the epiphyseal plate. Proof of this is in part due to proper interpretation of transverse lines observed in the diaphyses of long bones following the clinical and experimental administration of phosphorus.

These radiopaque lines not only show the relative amount of growth occurring at the ends of long bones, but also prove beyond doubt that the shaft growth is the result of activity on the diaphyseal side of the epiphyseal cartilage.

Scant attention has been given the subject of growth of the epiphyses. Interpretation of radiopaque lines in the epiphyses as the result of disease or phosphorized cod-liver-oil medication presents proof that the growth of the epiphysis occurs by proliferation of the articular cartilage followed by endochondral ossification and that the epiphyseal cartilage (plate) is a negligible factor in longitudinal growth of the epiphysis if it contributes at all.

Photographs of roentgenograms are presented which show formations of semicircular phosphorus lines in epiphyses with subsequent epiphyseal growth limited to the juxta-epiphyseal side of the articular cartilage.

The convex surface of the radiopaque semicircular phosphorus line conforms roughly in contour with the juxta-epiphyseal outline of the articular cartilage

and its base is adjacent and parallel to the epiphyseal line. Endochondral growth and ossification of the articular cartilage occurs everywhere except at the epiphyseal line (cartilage or plate).

Photographs of roentgenograms showing a surgically fused knee with considerable subsequent diaphyseal growth and no increase in the vertical diameter of the combined fused epiphyses is presented. ROBERT P. MONTGOMERY, M.D.

Cretin, A.: Reflections on the Histogenesis of Bone in the Light of Studies of Delayed Consolidation (Réflexions sur l'histogénèse du tissu osseux à la lumière de l'étude des retards de consolidation). *Presse méd.*, Par., 1940, 48: 996.

For the examination of some 30 specimens from areas of delayed consolidation of fractures, Cretin has used many different stains. He comes to the conclusion that the construction and regeneration of bone depends primarily upon the osteoblasts. There are two types of osteoblasts, which can be distinguished by different stains. The first type fuse completely with the pre-osseous substance and lose their nuclei; the second type retain their nuclei and become the true bone cells. There is a close relationship between the osteoblasts and the muscle tissue and especially the interfascicular tissue and fluid. The osteoblasts, the author believes, receive their "sustenance" from the muscle; if muscle is absent or deficient, normal regeneration of bone is impossible. Local hemorrhages interfere with the regeneration of bone and consolidation of fractures. Chemically, the author notes, normal construction of bone proceeds most rapidly in areas where no iron is present. The question of the regeneration of bone cannot be studied by observation of bony tissue alone; the surrounding structures, especially the muscles, must be considered, if the process is to be fully understood. Only in this way can certain problems of the orthopedic surgeon be solved.

ALICE M. MEYERS.

Smith, A. DeF.: Congenital Elevation of the Scapula. *Arch. Surg.*, 1941, 42: 529.

Because the upper limb of an extremely young human embryo lies in the cervical region and migrates to the normal adult location during the period between the ninth and thirteenth weeks of development, it is evident that congenital elevation of the scapula originates at a time when it is inconceivable that external pressure could be any factor in its production. Evidence gathered from both comparative anatomy and embryology indicates that the not infrequently associated bony mass connecting the scapula and cervical vertebræ is analogous to the suprascapular bone of the lower vertebrates. In these lower forms, the suprascapular bone is occasionally a rigid connection between the scapula and the spine.

In 14 patients a connection was found between the high scapula and the spinal column. This may be of considerable importance in limiting motion of the arm, or in interfering with efforts to lower the scapula. Associated congenital deformities of other parts of the body were present in 27 of the 50 cases that were studied, which tends to confirm the thesis that a high scapula is a true congenital deformity. Of these additional congenital deformities, vertebral maldevelopment in the cervical and upper thoracic region was most frequent.

Operations are not believed to be warranted if the functional and cosmetic defect is slight. With marked limitation of abduction due to the presence of an omovertebral bone, function may be improved by excision of the bone. Severe deformity may require a complete release of the scapula and retention of the bone in a lower position by fixation to a rib. Neurological complications have been reported following this procedure.

Operation was performed on 14 of the 50 patients and the procedures used were classified into three groups:

1. Simple excision of the omovertebral bone or fibrous band without extensive release of the scapula or any serious effort to lower it.

2. Extensive subperiosteal dissection of the scapula from its attached muscles; removal of the omovertebral bone, if present; and excision of a large portion of the scapula, including the spine and all the bone above it, but without any attempt to anchor the scapula in a lower position.

3. The procedure just outlined with retraction of the scapula to a much lower level with suture to a rib. Only a small portion, if any, of the supraspinous portion of the scapula is excised, however, on such occasions. HOMER PHEASANT, M.D.

Hipps, H. E.: Muscle Pathology in Anterior Poliomyelitis; Its Relation to Function. *South. M. J.*, 1941, 34: 135.

It has long been considered that if a partially paralyzed muscle has had adequate rest, bracing, and physical therapy for a period of two years or more, that muscle has had the maximum treatment. No further increase in strength can be expected, and operative procedures to replace that muscle's function are then indicated.

By means of a grant from the National Foundation for Infantile Paralysis an intensive study of the gross and microscopic pathology of poliomyelitic muscles was made. As a result of this study, it was found that many of these muscles could be further strengthened by an operative procedure on the muscle itself, an increase of its intrinsic power being produced.

The primary impetus for this study was furnished by the dissimilarity in size of 2 children's paralyzed legs. Both children were the same size and both had the right leg paralyzed; but in one, the leg was nearly as large as the normal leg, whereas in the other the leg was thin, shrunken, and markedly atrophic. In both children, however, the muscles all graded zero, and the foot was entirely flail. Later at operation, when a biceps femoris transplant was made to the

patella on a patient whose quadriceps graded only a trace, the muscle was visualized. In this case it was easy to see why a contraction of the muscle belly itself would be ineffective. The pull was simply on the intervening fibrofatty mass and was not transmitted to the patellar tendon; yet there lying within that muscle belly above the fibrofatty zone was enough power to function almost normally in the leg, if the power could be utilized.

This study was carried on by making observations at operation on cases of postpoliomyelitis of two or more years' duration. During the course of a standard operation the skin incision would be lengthened and full inspection of the muscle made. A description was dictated to a secretary, and sketches and photographs were made. The muscle was also tested by mechanical stimulation for its ability to contract, and its elasticity and degree of tension were noted. Microscopic sections were taken from various areas.

The gross or microscopic changes that occur in the later stages of poliomyelitis of the muscles are: atrophy, degeneration, fibrous replacement, and fatty replacement. All of these pathological phases occur in almost every muscle, but the degree of change varies so much that one muscle may show predominantly an atrophic change and another a fibrous replacement, or some other type of change. Classification was made on the basis of predominant microscopic change as follows:

1. Homogeneous atrophic and degenerative change
2. Muscle replacement change
   a. Fibrous
   b. Fatty
   c. Fibrofatty
3. Irregular atrophic and degenerative change

The homogeneous atrophic and degenerative change is the most common pathological involvement found. The muscle is uniformly diminished in size and is homogeneous in color and general structure which gives the appearance of a very atrophic flabby structure. The muscle usually contracts when pinched, but feebly. It most often retains some elasticity and is usually graded as poor or showing only a trace of power.

Muscle replacement is the least common type of change. The muscle is definitely smaller than normal. The color is almost uniformly gray or yellowish gray. It seems to be almost completely replaced by fibrofatty tissue. In some muscles this change is predominantly fatty and in others it is predominantly fibrous; while in others there is a rather homogeneous fibrofatty appearance. They will not contract when pinched and they have no elasticity. They will stretch, but when stretched, they will not return to their former length. They usually grade "zero."

The irregular atrophic and degenerative change is second in frequency. It involves only the larger muscles. There is no uniformity in color, shape, size, or degree of atrophy and degeneration in these muscles. This lack of uniformity allows advantage

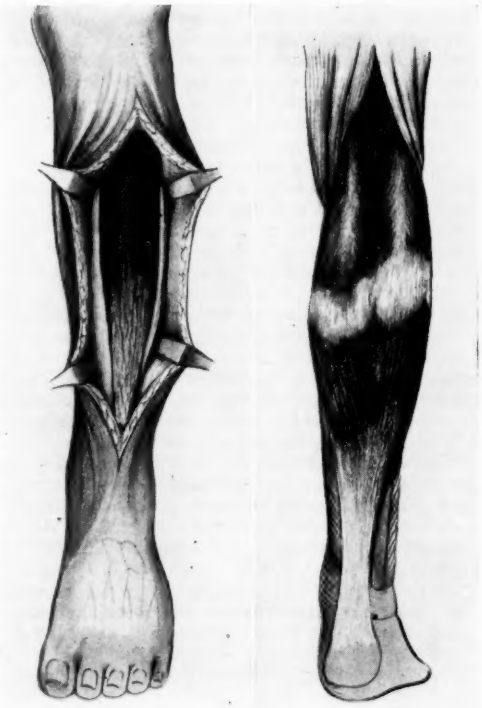

Fig. 1, left. Muscle grade, fair plus. There is a zone of degeneration about the musculo-tendinous junction. The muscle above is good. Contraction is ineffective because of a loose, weak lower zone which stretches and does not transmit pull to the tendon.

Fig. 2. Muscle grade, poor. There is a zone of fibrofatty degeneration across a fairly good muscle. A contraction in either muscle belly is ineffectual because of this zone. This may have resulted from a stretch tear or perhaps from the pressure of the calf band of a brace.

to be taken of their peculiar pathological structure to increase their strength by a surgical procedure.

In this group it was found that the degenerative and atrophic change was often definitely localized. When found in the region of the musculotendinous junction (Fig. 1) this area was stretched but contraction of the remaining muscle was permitted, which thus rendered the contractile power less effective or interfering with the transmission of the pull to the tendon by the interposed fibrofatty tissue. Localized areas of fibrofatty tissue were also found in the belly of a muscle, and if large enough this intervening zone would eliminate transmission of the impulse from the upper segment and make contraction of the lower segment less efficient because it was not firmly fixed above (Fig. 2).

Speculation on the origin of this zone is interesting. It may be a tear in the muscle that occurred in

the early stage when the patient tried to walk too soon. It is not likely that such a tear occurs suddenly with dramatic violence so that the patient can remember when it may have occurred. A stretching out or "stretch tear" localized at one zone, growing greater with each attempt to overuse the muscle, is the most likely mechanism.

Because of the presence of this zone in areas of fairly good muscles in such regions as to render function less effective, various operative procedures have been suggested, such as excision of the fibrofatty area and resuture of the muscle, or reinforcement of this area with sutures of fascia lata. Because of the multiplicity of the problems that would present themselves, no special operative procedure is advocated. It is believed that elimination or reinforcement of this area is of the greatest importance and that many muscles which had previously been considered as reaching their maximum degree of recovery can be further strengthened by a properly executed surgical procedure.

The author's end-results have been too few for proper evaluation but he states that 50 per cent of his patients that have been operated on have shown a definite increase in muscular strength.

F. HAROLD DOWNING, M.D.

Graff, U.: Disease of the Sacro-Iliac Joints, with Particular Consideration of the Inflammatory Diseases and Their Origin (Erkrankungen der Ileosakralgelenke, mit besonderer Berucksichtigung der enzuendlichen Erkrankungen und ihre Entstehung). *Beitr. z. klin. Chir.*, 1940, 171: 226.

The close relations of the psoas muscle and the parts of the lumbar plexus, which are separated only by the thin joint capsule of the joint space, are anatomically significant. The proximity of the autonomic nervous system and the compact apposition of the rectum along the left sacro-iliac joint are also important. The clinical symptoms of diseases of the sacro-iliac joints fall into two groups: (1) inflammatory nervous manifestations, which generally lead to a diagnosis of sciatica and reflex signs in the region of the lumbosacral plexus; and (2) static disturbance with limitation in the position of relief: rigidity of posture and lumbar scoliosis with convexity toward the well side. Tenderness of the joint may be elicited quite frequently by vaginal or rectal examination. Additional symptoms include: pain on hyperextension, on crossing the legs in the sitting position, and with each change of position; painful limp, and stiffness of the hip in walking. Diagnosis by means of the roentgenogram is difficult because of the many variations which occur on account of the oblique plane of the joint from behind medially toward the anterior and lateral aspects; negative findings are of no significance. Traumatic lesions, such as isolated subluxation in association with pelvic fractures, are seldom revealed. The joint may participate quite early in Bechterew's disease; periosteal proliferation due to lymphogranuloma may involve the area and produce honeycombed densities of the adjacent bony parts. Osteitis fibrosa and deformans affect the joint. Sacro-iliac tuberculosis, which generally occurs between the ages of twenty and thirty-five, is practically always secondary, especially to diseases of the female sex organs particularly during pregnancy: the primary focus involved the anterior aspect of the sacrum in 61.8 per cent, and the posterior side in 38.2 per cent. Roentgenograms in large destructive foci often are insignificant, just as the clinical manifestations at the onset; later, sciatica, painful limp, fever, debility, the positive Trendelenburg sign, or gravitational abscesses give the first evidence leading to a diagnosis and a recognized course of the disease. In indefinite sacral pains the sacro-iliac joints should be thought of more often. Osteomyelitis of the ilium attacks the joint in practically every case, whereas osteomyelitis of the sacrum practically never spreads to the joint. Perforations occur especially along the iliacus or along the rectum, and not infrequently through the acetabulum into the hip joint. Only early radical treatment can bring healing to most of the severe septic cases.

Infectious arthritis was observed in the course of polyarthritis, but also in the most varied infections of other types, such as grippe, scarlet fever, typhus, sepsis, measles, small pox, diphtheria, syphilis, and actinomycosis. Gonorrheal sacro-iliitis generally runs its course without destruction of the joint; foci of infection are not infrequent. A second group of inflammatory lesions, having local origin, have thus far been described infrequently: during the puerperium traumatic lesions are easily produced, especially in the left sacro-iliac joint (tears of fasciæ and capsule; hemorrhage and avulsion of the periosteum). Nevertheless, localization of a suppurative process in the internal genitalia is rare. In definite cases of disproportion between the head and the widest part of the pelvis, a severe phlegmonic inflammation of the sacro-iliac joints and of the pelvic connective tissues was observed during the puerperium in association with a spreading apart of the three pelvic articulations; vaginal tears were discovered as the points of exit of the infection. Other cases from Schmieden's Clinic, which were observed to have a predilection for the left joint following resection for carcinoma of the rectum (3 cases in 1,000), also belong in this group of cases of inflammatory sacro-iliac arthritis. After a smooth course immediately after operation a sciatic type of pain developed in these cases, which was followed by fever, leucocytosis, and localized edema of the soft tissues in the vicinity of the joint; finally, quite late, destruction and ankyloses were recognized roentgenologically. All 3 cases healed in several months without surgical intervention. Despite all aseptic precautions during the resection of the rectum, as in all open wound care, and despite a smooth course of wound healing and closure of the retained rectal stump, infection of the joint ensued. The author attempts to explain this on the basis of a damming back of wound secretions and infected

mucous material. Nevertheless, he advises against a primary resection of the descending portion of the sigmoid, since this would increase the danger of the complications mentioned above. The pain of this disease is unbearable despite antipyretics and morphine. Diathermy may be used in early cases. Early functional treatment is recommended to combat the accompanying severe atrophy involving the skeletal musculature.

(Sievers). Jerome G. Finder, M.D.

Lenggenhager, K.: Concerning the Genesis, Symptomatology, and Therapy of the Subluxation Symptoms of the Knee Joint (Ueber Genese, Symptomatologie und Therapie des Schubladensymptoms des Kniegelenkes). *Zentralbl. f. Chir.*, 1940, p. 1810.

As the result of a heavy blow against the outer side of his right knee the author's patient had a markedly weak knee, which indicated an injury of the medial lateral ligament, and, moreover, a definite forward subluxation, so that a tear of the cruciate ligament had to be considered also. However, operation showed only a completely torn mediolateral ligament. The cruciate ligaments were uninjured.

Because of this, Lenggenhager investigated the conditions in more than 80 fresh cadaver knees and came to the conclusion that not the injury of the anterior cruciate ligament but the injury of the medial lateral ligament produced an anterior subluxation. The anterior cruciate band runs from behind, above, and outside to a point in front, below, and within and is first put under tension only in full extension. It can be divided without producing subluxation of the knee. The posterior cruciate band runs from above, within, and forward to below, behind, and outward and shows its greatest tension in flexion of the knee joint and its greatest relaxation in extension of the joint. The separation of this ligament produces in the normal knee bent at a right angle a marked posterior subluxation. Such an injury seldom occurs since the posterior cruciate ligament must first be stretched by greater flexion and in such a position the knee can only rarely be affected by gross violence. However, further investigation showed that subluxation less than 1 cm. indicated an injury of the structures of the medial portion of the capsule, but with subluxation over 1 cm. an injury of the anterior cruciate ligament was also likely. If the mediolateral ligament were cordlike it could prevent neither an anterior nor a posterior subluxation; but since it is fanshaped and runs from the tibia to the middle point of rotation of the femoral condyle, it is able to prevent this occurrence because its anterior fasciculus of fibers acts as a check. Besides preventing the forward subluxation the mediolateral ligament prevents the symptoms of weak knee seen in injuries of this ligament and increased outward rotation of the lower leg. If such signs are present and, moreover, incarceration of the meniscus appears, then the lateral ligament is torn.

In such injuries, but also in simple traumatic relaxations Lenggenhager proceeds to operate under spinal anesthesia; local anesthesia is avoided. He has constructed for this purpose a special pair of compasses to estimate the central point of rotation in the femoral condyle and a rust-proof nail from 2.7 to 2.9 cm. long and 1.3 mm. thick. Silk cord 1 mm. in diameter is also used. After determining the length to be used this silk should be held under slight tension during its sterilization in one-tenth of 1 per cent mercury-oxycyanate so that it does not shrink after submerging it. With the knee bent at a right angle, a curved incision is made along the patella over the joint space. The skin flaps are dissected together with the subcutaneous fat down to the fascia, and a longitudinal incision of the fascia is made over the joint space. Blunt dissection of the fascia is used to show definitely the lateral ligament, and the point of rotation of the mediofemoral condyle is estimated. Transverse division of the lateral ligament and capsule is then done to inspect the joint with the relaxation thus produced, the mediolateral ligament being sewed with excision of the edges for from 3 to 8 mm. in cases of necessity, and the nail is inserted in the central point of rotation. The first silk check rein is applied parallel to the joint space by passing it through the periosteum of the head of the tibia, pieces of silk of the same length are fastened to the periosteum, and the second silk check rein is applied in the same manner somewhat further forward on the tibia preparatory to fastening the cord over the nail without knotting it. The position of the nail is then examined, and the nail is driven in deeper; the silk cord is knotted and fastened by running transverse catgut sutures in order to produce scarring with the underlying tissues more quickly and intimately; then fascial suture and skin suture are made, and the knee, flexed to a right angle, is mobilized with adhesive tape. After the first day the knee should be moved passively with care and in the first week the movement should be from 10 to 15 degrees over and under a right angle. After three weeks the patient stands with a longitudinal support of starch bandage. After seven weeks reckoned from the time of operation the support is removed. In this manner 12 patients have been operated upon, in 9 with good results and in 3 with moderately good results.

(Plenz). John R. Paine, M.D.

Milone, S., and Midana, A.: Recurring Hydrarthrosis of the Knee Due to the Virus of the Disease of Nicolas and Favre (Idrartro recidivante del ginocchio da virus della malattia di Nicolas e Favre). *Minerva med.*, 1940, 31: 519.

Only 37 cases of poradenitic (lymphogranulomatous) arthritis are reported in the literature. They show that the disorder involves one or several joints, has a preference for the knee or the hip, and appears suddenly and has an acute or subacute course with rapid resolution, or becomes recurrent or chronic. Cases with an essentially chronic course

seem to be extremely rare. The disorder attacks both sexes equally and is more frequent in adults. The articular effusion is rather slight and may be serous, seropurulent, or purulent. Roentgen examination shows usually intact, exceptionally decalcified articular surfaces which are somewhat separated. As a rule, the joint returns to normal under adequate treatment. The diagnosis should include attempts at demonstrating the specific antigenic activity of the articular effusion. The disorder may be the result of a secondary or of the only localization of the virus.

The authors report a case of recurring hydrarthrosis of the knee in a woman with poradenitic anorectitis, in whom the history and the clinical and laboratory findings did not leave any doubt about the specific nature of the arthropathy; in fact, the proctitis was associated with a strongly positive Frei test and the articular fluid, which was negative when injected intradermally in lymphogranuloma patients, gave a positive result when used after considerable concentration (4 to 1). This observation explains the apparent absence of active substance in the articular fluid when the latter is abundant as in hydrarthrosis. Other notable aspects of this case are: the recurrent character of the arthropathy which is very seldom encountered; the occurrence of two attacks in one knee and of one in the other, the latter appearing immediately after an intradermal Frei test; and the simultaneous appearance of lesions of polymorphous erythema. RICHARD KEMEL, M.D.

Shanin, A. P.: The Clinical Picture and Treatment of Synovial Tumors. *Nov. khir. arkh.*, 1940: 46, 291.

Synovial tumors originate in tendon sheaths, bursæ, and articular capsules. They may be divided into two groups: giant-cell tumors and malignant tumors, also called synoviomas or synovialomas. In the first group, in addition to giant cells, also spindle, polygonal, and so-called xanthomatous cells, containing cholesterin, are found.

As to the histogenesis of the tumors of the tendon sheaths, there are found in peripheral portions of the neoplasms collagenous fiber bands resembling tissues of which tendons are built. The development of giant cells was ascribed by several writers to a disturbance of the cholesterin metabolism, but attempts to provoke a formation of xanthomas by hypercholesterinemia and trauma failed. The author maintains that an excess of cholesterin, as well as trauma, is only a contributing factor to the pathogenesis of giant-cell tumors.

As a rule, the tumors grow very slowly and do not annoy the patients greatly and therefore usually one or even a few years elapse before a physician is consulted.

The majority of the tumors are located on fingers and toes. Tumors of the fingers usually have a benign course while those of the feet show a tendency toward recurrence and necessitate repeated, frequently deforming operations. Tumors of the palms and forearms are less benign than those of the fingers but less malignant than those of the feet. Not infrequently an exudate appears in the affected articulation, superficial veins become enlarged, and the local temperature rises. Roentgenograms do not show any osseous changes but the tumor itself may cast a shadow. Pains may be absent. Metastases are rare. A differential diagnosis between tumors and tuberculosis of the joints may be very difficult. Tumors originating in bursæ must be differentiated from inflammatory processes, while neoplasms of the tendon sheaths may be mistaken for sarcomas of the muscles.

The author treated 17 patients with synoviomas. Six had giant-cell tumors which were removed. The remaining 11 patients had malignant tumors and in the majority of cases were treated surgically. In the first-mentioned group all patients were alive from one to ten years after the operation, while in the second group only 6 were alive from a few months to seven years after the surgical procedure. All tumors were removed together with the capsule.

JOSEPH K. NARAT, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Blum, L.: Partial Myotomy in the Treatment of Divided Flexor Tendons of the Hand. *Ann. Surg.*, 1941, 113: 460.

Tension at the site of repair is one of the factors responsible for poor results following division of the flexor tendons of the hand.

A simple method of myotomy consisting of simultaneous division of the tendon prolongation at a selected site in the forearm is proposed as a corrective procedure.

The position of acute fixed flexion following tendon sutures rests the muscle and decreases its tension, but it does not obviate the pull at the suture line. This fact is amply demonstrated by the very real tension invariably found as divided flexor-tendon ends are approximated while the patient is under complete anesthesia. Despite an immobilizing plaster splint, normal muscle tone exerts its continuous dehiscent force on the suture line during the entire postoperative period. This is considerably more marked with flexors than with extensors because of the preponderant muscle bulk of the former, normally expressed by a flexed attitude of the relaxed hand.

From the viewpoint of function, the tendon is merely a cord transmitting the muscle pull. The reaction of muscle to injury such as laceration differs markedly from that of tendon. The former has a rich blood supply, healing promptly with minimal loss of strength. The highly contracted scar in a muscle belly does not seem to interfere with its subsequent function, a demonstrable fact in any extensively lacerated wound of the extremities.

The flexor muscles of the forearm are of the unipennate type with the tendon prolonged throughout

the length of the muscle. Hence, division of the muscle which includes the tendon-prolongation results in a loss of contractile power, the degree of which bears a direct relationship to the site of division. Since this point in the 2 cases reported was selected at the junction of the distal third with the proximal two-thirds of the muscle, it is apparent that only the fascicles in the distal third were able to exert any pull through the tendon. As the muscle wound healed, uniting the divided portions of the muscle and the divided ends of the tendon-prolongation, the muscle power returned so that, as in the first case, the patient regained more than two-thirds of the muscle strength within nine weeks of the time of operation. The myotomy wound evidently healed *pari passu* with the repaired tendon so that during the second month of convalescence the muscle power rapidly returned at a time when the tendon was once again able to bear the full stress.

There are two additional advantages to this procedure. First, following the myotomy the interval between the divided tendon ends is diminished by an actual transposition of the tendon because of the gaping of the muscle wound. This amounts to at least ½ in., and serves to allow approximation of the tendon ends in addition to the main purpose of relieving the tension on them. This may be of use in secondary tendon surgery as a substitute procedure for the grafting of short, free tendons. Second, following the procedure it is possible to place the hand and finger in a neutral or slightly flexed position. This is of real advantage during the period of convalescence since it is far easier to regain normal function in a finger so placed than in one that has been coiled up in the most acute flexion for a month postoperatively.

Two case reports are presented in detail with preoperative and postoperative photographs of 1 of the cases. ROBERT P. MONTGOMERY, M.D.

FRACTURES AND DISLOCATIONS

Urist, M. R., and McLean, F. C.: Calcification and Ossification. Calcification in the Callus in Healing Fractures in Normal Rats. *J. Bone & Joint Surg.*, 1941, 23: 1.

This article presents the results of histological observation of the progress of calcification in the healing of experimental fractures in rats. The study shows that the new osseous tissue is calcifiable when it is laid down, and that under optimum conditions a preliminary stage of uncalcified osteoid is not typical of bone formation in the callus.

The healing process in the fractures observed is essentially one of formation of a fibrocartilaginous callus in and around the defect in the shaft, and the subsequent invasion, removal, and replacement of the fibrocartilaginous mass by new bone arising from the cambium layer of the periosteum and from the endosteum.

Bone matrix is formed subperiosteally and subendosteally, first at some distance from the fracture line, at about the second or third day following a fracture. It is calcified as it is laid down under optimum conditions with no appreciable interval between its formation and the deposition of bone salt within it. As the new bone invades the fibrocartilaginous callus, it removes the fibrous tissue, fibrocartilage, and hyaline cartilage, and replaces them with bone matrix. In this process remnants of the invaded tissue may be utilized and converted into bone matrix by the invading osteogenic cells. In all instances the new matrix is calcifiable as soon as it is recognizable as osseous tissue.

A lag in calcification of newly formed osseous tissue may occur. This is attributed to failure in the supply or transport of bone minerals, rather than to lack of ability of the bone matrix to calcify.

The matrix of hyaline cartilage becomes calcifiable when the adjacent cartilage cells become vesicular or hypertrophic. The calcification of cartilage matrix is further conditioned by its relationship to the bone tissue invading the fibrocartilaginous callus. Only matrix in contact with the invading bone calcifies, and, if the matrix has not been made calcifiable by hypertrophy of the adjacent cells, it calcifies only when converted into bone matrix by the advancing osteogenic process.

Only tissues recognizable as bone matrix or cartilage matrix calcify in the callus. There is no random calcification in the fibrocartilaginous callus, the great mass of which remains completely free from bone salt except where it is invaded and converted into bone from its periphery.

Particles of bone, including their bone salt, have been demonstrated in foreign-body giant cells and in macrophages during the resorption of necrotic bone. Fragments of dead cortical bone have been observed to undergo decalcification in advance of the disintegration of the bone matrix. This differs from the process of resorption of living bone, in which the bone mineral and organic matrix are removed simultaneously. No phagocytic activity of osteoclasts, either for particles of bone or for bone salt, has been demonstrated.

The authors have made no effort to prove or disprove the origin of bone from the osteocytes of the compact bone, but have not seen evidence that this was possible under the conditions of our experiments.

Detailed diagrammatic representations, photomicrographs, methods of tissue fixation, and preparation of the experimental material is presented.

ROBERT P. MONTGOMERY, M.D.

Willard, DeF. P., and Nicholson, J. T.: Dislocation of the First Cervical Vertebra. *Ann. Surg.*, 1941, 113: 464.

Dislocation of the first cervical vertebra is the partial or complete loss of contact of the inferior articulating surfaces of one or both lateral masses of the axis with the corresponding superior articular facets of the epistropheus. The dislocation may be anterior, right or left rotary, posterior, and right or left lateral. A fracture of the odontoid generally ac-

companies the latter two types and traumatic dislocations are frequently associated with a fractured odontoid.

Dislocations may result from trauma, infection, paralysis, or congenital defects.

Infection is rarely found in the vertebræ; it is usually in the surrounding tissues. Following such infections as adjacent cervical sinusitis, pharyngitis, tonsillitis, mastoiditis, adenitis, or dental abscess, the ligaments supporting the atlas on the epistropheus become relaxed and permit a spontaneous dislocation. Bone decalcification and joint involvement may follow these infections. The vertebral bone may be destroyed by pyogenic, tuberculous, or syphilitic osteomyelitis.

The diagnosis indicated by a few constant symptoms and signs and the verification of the diagnosis is determined by the roentgenogram. The head is held in a torticollis position. The chin is frequently held tightly against the larynx. It is often difficult to open the mouth. Dysphagia and voice change may be observed. Pain is in the occipital and mastoid areas because of the region served by the second cervical nerve. These areas are tender to touch. Motion, particularly extension, increases the pain. The subject rises, supporting the chin in his hands. On attempted cervical motion, grating of the neck is experienced. This may be audible to the examiner. The head can be laterally flexed but only slightly from the side to which it is tilted. The chin cannot be rotated past the midline, in the attempt to correct the rotation deformity, so that the subject must turn his entire body to see over the opposite shoulder. Posteriorly, the paraspinal muscles are prominent on the side to which the chin rotates. This prominence is accentuated if any attempt is made to straighten the head. If the mouth can be opened, the pharynx will bulge on the side to which the head is tilted. Paralysis is relatively infrequent in those cases surviving the force producing the dislocation. When present, however, it is more common in the arms. Sensation may be retained as the pyramidal decussation lies directly behind the odontoid.

The absence of neurological findings could account for mistaken diagnoses of pharyngeal abscess and cervical arthritis; while less frequently the delayed and gradual onset of neurological symptoms would be confused with cerebellar tumor, syringomelia, bulbar palsy, and myasthenia gravis. Neurological complications are infrequent, however.

The dislocation should be reduced as soon as possible after recognition. Dislocations of the first cervical vertebra can be safely and easily reduced spontaneously with the head hanging dependent, unless they are posterior dislocations, or if neurological complications are present. This method is not adaptable for posterior dislocations of the first cervical vertebra which are accompanied with a fractured odontoid, as, theoretically, the deformity would be increased and cord compression could result. Caution is indicated in its immediate application after traumatic dislocation in which edema of the cord would cause a further paralysis. In treating fracture dislocations in other regions of the cervical spine by this method, it was learned that children tolerated it better than adults. An uncomfortable complication in adults was edema of the scalp.

Two or three short mattresses are placed on the fracture bed. The head is gradually extended farther over the end of the top mattress for the first twenty-four to forty-eight hours, until the subject's shoulders rest on the edge of the mattress. The head then hangs free for another twenty-four to forty-eight hours. The subject is held in position by applying Buck's extension to the legs and raising the head of the bed. When rotation and lateral flexion of the head are free and equal in both directions, reduction has been accomplished. The reduction is checked roentgenologically simply by transferring mattresses and child with head hanging over the end onto a stretcher and transporting him to the roentgenographic department, if no portable apparatus is available. Roentgenograms are taken without disturbing the position of the head by holding a casette on the side of the neck for the lateral view and with the casette in back of the head for the anteroposterior view.

Reduction is maintained by a plaster bandage from and including the head to the pelvis. The method of applying the plaster bandage is to transfer the patient from the mattress without supporting the head, so that his back rests on the canvas sling of an Abbott frame and the head hangs dependent. A body jacket is then applied. As this dries, a table of suitable height is pushed beneath the patient. The canvas sling is released so that the table supports the patient's trunk. The Abbott frame and sling of canvas are then removed. A 4-in. muslin bandage, with a longitudinal slit in its midportion which will permit it to be slipped over the patient's head to run beneath the chin and occiput, is arranged so that the ends may be tied behind the operator's back. In this way the operator can exert traction and control the amount of extension of the neck. The extension which occurs at the occipito-atloid joint is not necessary, and not desired, as it will fix the subject's head looking heavenward. The head encasement is then applied over the traction bandage, which can be withdrawn after the head and body parts of the plaster cast are joined together.

Six cases of dislocation of the first cervical vertebra, the patients ranging from three to sixty years of age, are reported after observation from one to four years. Three patients had a traumatic history which was associated with a fractured odontoid. Three had spontaneous dislocations following associated infections in the cervical region. One with a fractured odontoid had a posterior dislocation. Two had anterior dislocations. One with a spontaneous dislocation had an anterior dislocation; 2 with spontaneous dislocations had rotatory displacement, one to the left and the other to the right. No patients had any neurological disturbance from the dislocation. All except the posterior dislocation were

reduced spontaneously with the head hanging dependent. Reductions were maintained by a plaster-of-Paris bandage, including forehead and pelvis, for three months if the dislocation was associated with a fractured odontoid, and for four months if it was spontaneous. A Thomas collar was used for six additional weeks. There were 2 complications. One patient, with delirium tremens, was uncoöperative, reduction could not be maintained by plaster fixation, and death resulted from pneumonia. The second patient had 3 recurrences in fifteen months, each time after mechanical fixation was discontinued. This patient underwent 2 surgical attempts to maintain reduction. The second surgical procedure which consisted of wiring the posterior arches of the first and second cervical vertebræ and a spinal fusion has remained successful for twenty-one months, with no external fixation for seventeen months.

A recurrence of a dislocation after the described care requires operative fixation.

ROBERT P. MONTGOMERY, M.D.

Clark, W. A.: Fractures and Dislocations of the Cervical Portion of the Spine, with a Review of 89 Cases. *Arch. Surg.*, 1941, 42: 537.

Fractures and dislocations of the cervical vertebræ represent only about 0.5 per cent of all fractures. In the series comprising this report, the majority of the patients (50.5 per cent) were between twenty and thirty-nine years of age and males greatly predominated (79.7 per cent). As in other types of fractures, automobile accidents were responsible for the largest number (57.9 per cent), with a variety of other factors completing the list of causes.

A bilateral dislocation was commonly indicated by hyperextension of the neck. Contralateral tilting of the head and rotation of the neck suggested a unilateral dislocation. Deformity was not always associated with the fracture, but pain, while not a prominent complaint, was marked with motion of the head or neck.

The symptoms varied according to the level of the lesion. This relationship is well shown in Table 3 of the original article. In general, however, unconsciousness was most frequent (35.2 per cent) and paralysis and anesthesia followed in the order given, with an incidence of 26.1 and 21.5 per cent, respectively.

Fractures were present in 43 per cent of the group; dislocations occurred in 31 per cent, and combined fracture and dislocation were seen in 22 per cent of the series. Almost one-half of these lesions involved either the fifth or sixth cervical vertebra.

The relationship of the level of the lesion to neurological signs was of considerable importance, inasmuch as in lesions below the fourth cervical vertebra, anesthesia, paralysis, or both were present in a high percentage of the cases. In view of this fact the author recommends emergency head traction in extension and early efforts at reduction in order to avert severe and permanent paralysis as much as possible. Movement of the patient should be minimal, for injudicious changes in position occasionally result in sudden death.

The early application of extension is stressed and early laminectomy is recommended. Laminectomy should be performed on the patients with complete paralysis but who are without roentgenological evidence of impingement on the neural canal, since subdural edema can simulate cord division, and this may be relieved by incision of the dura.

Slightly over one-third of the patients were treated by extension and an ambulatory cast or brace. A cast only was used in 15.9 per cent and manipulation followed by a cast was the method of treatment in 6.8 per cent of the series. Skeletal traction was applied in 5.7 per cent, and occasionally it was necessary to wire spinous processes together in order to prevent recurrent dislocations.

The general mortality of the series was 25.8 per cent and was highest in the patients with lesions involving the fifth, sixth or both of these cervical vertebræ. Over one-third of the deaths (39.1 per cent) occurred within the first twenty-four hours, with the highest incidence among the patients showing complete paralysis. HOMER PHEASANT, M.D.

Bornebusch, K.: Aseptic Necrosis of the Head of the Femur after Fracture of the Neck in Childhood and Its Relationship to Perthes' Disease (Die aseptische Caputnekrose nach Schenkelhalsfraktur bei Jugendlichen und ihre Beziehung zum Perthesschen Krankheitsbild). *Deutsche Ztschr. f. Chir.*, 1940, 253: 458.

The not infrequent fracture of the neck of the femur in childhood often shows secondary aseptic necrosis of the head of this bone. In a particular case of lateral to medial fracture of the neck of the femur in a twelve-year-old boy with a satisfactory vertical fracture line of reduction, capital necrosis developed secondarily; it occurred with practically no clinical evidence, the first signs appearing after a long period of clinical treatment despite good consolidation of the fracture. A critical consideration of aseptic necrosis of the head after cervical fracture and osteochondritis coxæ juvenilis (Perthes' disease) suggests that both lesions are identical and speaks for the development of Perthes' disease on a traumatic basis. Likewise, the vascular theory, that the disturbance of nutrition of the proximal end of the femur is at fault, permits, after roentgenological studies, the supposition that the insufficient circulation also may be accepted as the cause of aseptic necrosis of the femoral head after fractures of the femoral neck in children. The fact that aseptic necrosis of the head of the femur following femoral-neck fracture presents a picture of the Perthes' type of lesion only during childhood suggests constitutional peculiarities of the proximal end of the femur in children. As prophylaxis against aseptic necrosis it is necessary for the patient to remain in bed a sufficiently long period and rest with complete elimination of function of the affected joint; later,

a non-weight-bearing caliper brace is prescribed. (SONNTAG). JEROME G. FINDER, M.D.

Ottolenghi, C. F., and Maulucci, P. T.: Fracture Dislocations of the Tarsal Scaphoid Bone (Fracturas luxaciones del escafoides tarsiano). *Bol. y trab. Acad. argent. de cirug.*, 1940, 24: 1157.

Traumatic lesions of the tarsal scaphoid are not very frequent. We must distinguish between isolated fractures of the body or tubercle of the scaphoid and fractures of the body of the scaphoid with luxation of the fragments. The former are simple to treat and offer a good prognosis; the latter are more difficult to treat and offer a bad prognosis. The present study is concerned only with the latter condition. The former is successfully treated by simple immobilization for about six weeks. The author then presents a detailed outline and classification of the traumatic lesions of the tarsal scaphoid bone: simple fracture, fracture with luxation, luxation-fracture, fracture of the scaphoid tubercle, simple luxation, and total enucleation of scaphoid.

The causes of fractures of the tarsal scaphoid are listed as trauma to the dorsum of the foot tending to flatten it, trauma to the posterior part of the leg or heel, torsion of the foot without falling, falling on the front of the foot, and direct trauma to the bone. In general the lesions of the scaphoid are produced by extreme flattening or extreme flexion.

Fracture dislocations of the scaphoid offer a poor prognosis. The purpose of treatment is to reduce the luxation and maintain the position. To accomplish this, manual reduction, skeletal traction, partial or total resection of the scaphoid, and astragaloscaphoid arthrodesis may be used. The various methods are discussed in detail and numerous drawings and illustrations are included, which clarify the text.

There is a detailed clinical report on 6 cases showing most of the discussed conditions. Roentgen-ray illustrations are presented showing the condition at the onset and while under treatment.

In difficult cases osteosynthesis by means of a spike or nail permits exact reposition of the fragments of bone. Arthrodesis may be necessary in certain cases to prevent a varus position. Resection of the scaphoid may be necessary in exceptional cases. JACOB E. KLEIN, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Homans, J.: Exploration and Division of the Femoral and Iliac Veins in the Treatment of Thrombophlebitis of the Leg. *New England J. Med.*, 1941, 224: 179.

The author notes that exploration of the femoral and iliac veins has been found useful in treating some of the varieties of thrombophlebitis peculiar to the leg. Its principal indication is undoubtedly to prevent pulmonary embolism, but it may be called upon to correct peripheral vasospasm in the limb served by the diseased vein, to oppose recurrence of attacks of femoro-iliac thrombophlebitis, and, once the femoral vein has suffered destruction of its valves by earlier attacks, to prevent backflow down the vein. The most frequent indication in the opinion of the author is the "bland" type of thrombosis, especially the sort that originates in the deep veins below the knee.

The diagnosis of thrombophlebitis in the deep veins of the lower leg rests on the following findings:

The patient experiences lameness on walking, especially when going up or down stairs; such swelling and cyanosis as are present are confined entirely to the leg below the thigh; there is no generalized edema as in phlegmasia alba dolens; the dorsiflexion sign—discomfort behind the knee on forced dorsiflexion of the foot—is positive; swelling and cyanosis are always relieved by a few days' rest in bed, and in several cases, ineffectually treated, have recurred more than once.

The treatment consists of rest in bed, the foot being elevated from 10 to 15 cm. on a small, soft pillow. The swelling and cyanosis always disappear in a few days, but the dorsiflexion sign usually lasts for a week or more. At the end of ten days, all signs of disease having gone, the leg is actively used in bed, the foot being exercised first, then the knee and thigh, as in riding a bicycle. After four days of this treatment the leg is bandaged from toes to knee with semi-elastic cotton bandage and the patient begins to walk. If none of the original signs recur, he is allowed to resume a full active existence about three weeks from the time he went to bed. However, if the patient gets up and the discomfort, edema, and, especially, the dorsiflexion sign reappear, the superficial vein is at once exposed and divided. Operation is recommended when the patient has already undergone several episodes of bed rest and relapse.

Evidence has been produced to show that bland, non-obstructing thrombosis of the leg, whether occurring in active life or life in bed, and whether confined to the venous plexuses among the muscles below the knee or occupying as well the femoral and even iliac veins, is a frequent source of pulmonary embolism. This type of thrombosis, though difficult of identification, can often be diagnosed, whether or not embolism has occurred, from a combination of clinical symptoms with discomfort behind the knee on forced dorsiflexion of the foot. Conservative treatment of this disorder is usually justified, but when embolism has occurred or when symptoms and signs have recurred at least once, exploration and division of the femoral vein are advisable.

Exploration and division of the femoral and iliac veins may also be indicated to cure peripheral vasospasm, especially when the vein has been the seat of previous thrombophlebitis, and to guard against the further recurrence of pulmonary embolism which has recurred once or more. For recurrent embolism, the author states that it seems best to operate immediately after the most recent episode, provided the same leg as before has clearly been affected, since at this moment exploration of the femoral region may demonstrate, more accurately than at any other time, the situation of the process. Exploration to relieve vasospasm is a field about which little is known. Any one of the three following types may be associated with a femoro-iliac thrombophlebitis: (1) the diffuse peripheral type, thought to occur principally in the venules just beyond the capillary bed; (2) a sudden constriction of the great artery accompanying the thrombosed vein; and (3) the late, diffuse peripheral spasm related to the early acute type, which may remain for years after an initial femoro-iliac thrombophlebitis has subsided.

Division of the superficial femoral vein in the presence of a bland, non-obstructing thrombosis below the knee is rapidly curative and leads to no swelling and cyanosis of the leg. Division of the common femoral and profunda veins for a bland, non-obstructive thrombosis that occupies the femoral vein itself causes considerable edema and cyanosis.

In concluding, the author states that division of the superficial femoral, common femoral, or even common iliac vein, following an old, canalized thrombophlebitis, causes little disturbance and may, because of the relief of the reflex vasospasm and the prevention of backflow in the vessel, be of benefit to the venous circulation.

HERBERT F. THURSTON, M.D.

BLOOD; TRANSFUSION

Mutti, P.: The Immediate Action of Vitamin B_1 on Blood Crasis (Azione immediata della vitamina B_1 sulla crasi sanguigna). *Folia demograph gynaec.*, 1940, 37: 431.

The author briefly reviews the mechanism of action and the clinical applications of Vitamin B_1 in various conditions affecting the nervous system, in the exchange of carbohydrates in cardiac activity, in the function of the gastro-intestinal tract, in preg-

nancy, and in hyperthyroidism. He also reviews the possible mechanism of action of Vitamin B_1 from the standpoint of a ferment or a hormone function. For example, he refers to the possible relationship between Vitamin B_1 and suprarenal cortex which certain investigators have indicated. He states also that there has been some evidence to suggest a relationship between Vitamin B_1 and renal secretion, and that Vitamin B_1 favorably influences water exchange in the body. He cites these various examples as evidence for the existence of the close functional relationship among Vitamin B_1, hormones, ferments, and enzymes.

The author then reviews the relation between vitamins and the blood. In this respect Vitamins A, C, and D are briefly considered as having some influence and the lack of these vitamins may result in slight anemia and leucopenia. The relationship of Vitamin B to hematopoietic activity is reviewed and considered in greater detail. In experimental pellagra a hyperchromic anemia is produced. In summarizing the experimental observations regarding the action of Vitamin B on the blood the author states that there is no characteristic influence on the leucocytes or platelets, but that immediately following the administration of this vitamin, there is an increase of red blood cells and hemoglobin. The efficacy of the Vitamin B complex in the cure of certain anemias is due to the tonic effect which it exercises on the gastro-intestinal tract. After reviewing further the action of Vitamin B complex on the blood, the author considered it desirable to determine experimentally whether the effect was due to the factor B_1.

His experiments were performed on 6 groups of rabbits, some of which were normal, and others gravid. Synthetic Vitamin B_1 (Roche) was administered intravenously in varying doses of 2½, 5, and 10 mgm. in the various groups. The blood studies consisted of the red blood-cell count, platelet counts, reticulocyte and white blood-cell count, hemoglobin determination (Sahli), and differential leucocyte count. These various blood studies were made at intervals of fifteen minutes, thirty minutes, one hour, and two, four, and six hours after the introduction of the Vitamin B_1. The results of these studies showed that following the introduction of Vitamin B_1 there is a relative increase in red blood cells, reticulocytes, and hemoglobin and that this increase begins within fifteen minutes after the administration of the vitamins and reaches its maximum in about two hours; then it descends to normal and reaches the lowest level in about six hours. The increase in red blood cells is constant in character, whereas this is not true for the reticulocytes and hemoglobin. The platelets, white blood cells, and differential leucocyte count show little or no change. The results were similar in normal and in gravid animals. Following splenectomy, similar results were obtained and on this basis the author states that the increase in red blood cells, reticulocytes, and hemoglobin following the administration of Vitamin B_1 is not influenced by the spleen. Vitamin B_1 was also found to have a slight hemolytic action.

In interpreting these results the author states that at first it occurred to him that one explanation was that they were produced by contraction of the spleen. However, the fact that similar results were obtained after removal of the spleen disproved this explanation. Other hypotheses which the author suggests as a means of explaining the results obtained in his experiments are: (1) Vitamin B_1 has a diuretic action which has been generally recognized and which he observed in his animals also; (2) Vitamin B_1 has a vasoconstrictor action on the cutaneous vessels and as a result of this an irregular distribution of the blood elements might be produced; and (3) the vitamin may have some direct or indirect influence on the hematopoietic system. None of these hypotheses alone is satisfactory to explain this mechanism and the author concludes that probably all play some rôle. MICHAEL DEBAKEY, M.D.

Macht, D. I., and Macht, M. B.: Phytotoxic Reactions of Some Blood Sera. *J. Lab. & Clin. Med.*, 1941, 26: 597.

The authors review previous works of one of the writers on phytotoxic studies of various blood sera. The method of study consisted in determining quantitatively the increment in length of the single well defined straight roots of seedlings of lupinus albus after their growth for twenty-four hours, in plant physiological (Shive) solution containing a small amount of the blood serum to be tested. The average increment of growth in 10 plants was compared with that of similar plants placed in the same physiological plant solution without the blood sera. The index of growth was then computed by dividing the increase in length of the test roots by that of the control-plant roots.

One of these writers reported several years ago that menstrual blood sera as well as the saliva, milk, urine, tears, and sweat of menstruating women had an inhibitory effect on the growth of lupinus albus seedlings. Other states in which they found in the blood similar inhibitory effects on the growth of lupinus albus seedlings were pernicious anemia, aplastic anemia, pemphigus, leprosy, trachoma, Hodgkin's disease, severe secondary anemia, lymphatic leucemia, sprue, radiation sickness, and advanced psychoses. RULON W. RAWSON, M.D.

Crosbie, A., Scarborough, H., and Thompson, J. C.: Studies on Stored Blood. Observations on the Coagulation Mechanism in Stored Blood. *Edinburgh M. J.*, 1941, 48: 41.

The authors studied the coagulation mechanism of stored citrated blood. The thrombocytes were found to disappear rapidly during the first seven days, but little destruction occurred after this period for at least forty-five days. The early increased coagulability of the stored blood was thought probably to be due to this rapid disintegration.

The fibrinogen content was found to remain normal for a period of fifty days. The prothrombin

level (Quick) was found to fall to about 60 per cent of normal in twenty days. The coagulation time (Howell) increased in the first three days and then gradually decreased.

From these findings the authors believe that blood stored up to ten days is not markedly inferior to fresh blood in respect to its coagulation mechanism and, after a first clinical test has been made, should be satisfactory in the treatment of many hemorrhagic disorders. THOMAS C. DOUGLASS, M.D.

Black, D. A. K., and Smith, A. F.: Blood and Plasma Transfusion in Alimentary Hemorrhage. *Brit. M. J.*, 1941, 1: 187.

The infusion of serum or plasma has been shown to exert a favorable effect not only in experimental shock in animals, but also in shock from burns and wound shock in the human subject. It has been argued that even in acute hemorrhage the absolute deficiency of red cells is of less importance than the vascular and circulatory derangement which prevents the effective access of blood to the tissues, and that the improvement of circulation following plasma infusion would outweigh the reduction in the number of red cells per unit volume of blood. The authors state that the object of their article is to compare the effects of citrated whole blood with those of plasma in the treatment of patients with massive bleeding from the stomach or duodenum. They present the case histories of 9 patients, all of whom were suffering from severe bleeding from the stomach or duodenum. The first 3 were treated with massive transfusions of citrated blood given by slow drip. The fourth patient was treated with reconstituted dried serum in four-fold strength. In Cases 5 and 6, plasma infusion was started but had to be supplemented by blood transfusion. In Cases 7, 8, and 9, it was possible to give plasma alone although Case 8 required the transfusion of whole blood five days later. The authors studied these cases and gave their hematological findings and the blood urea. They present their conclusions as follows:

In 9 patients with severe hemorrhage from the stomach or duodenum, plasma compared unfavorably with whole blood in its effects on the blood volume and hemoglobin concentration. It did not lower the degree of azotemia to the same extent as is shown by whole blood, and the general condition of the patients was adversely affected. It is suggested that the ill effects of plasma in these cases are due to forced dilution of the blood in excess of the limits favorable to recovery from hemorrhage. The circumstances which determine the usefulness of plasma in posthemorrhagic shock are discussed. In general terms, plasma is contraindicated when the hemoglobin is less than 50 per cent.

PAUL MERRELL, M.D.

SURGICAL TECHNIQUE

WAR SURGERY

Gorinévskaïa, V.: Organization and Importance of the Surgical Auxiliary in the Army (Organisation und Umfang der chirurgischen Hilfe im Armeebereich). *Chirurgija*, 1940, 2/3: 12.

The author presents a description of the organization of surgical aid in defensive and offensive operations under special conditions on the basis of his personal experience as a supervising and active army surgeon in a consultant capacity.

From the point of view of sanitary tactics, two basic requirements are imperative: (1) that timing must dominate over distance factors, and (2) that medicosurgical indications must be given precedence over merely evacuatory considerations. The war was fought in unusual local conditions—in a vast, uncultivated, uninhabited steppe, under a burning sun with water shortage and lack of rail communications. Thanks to motorization of the army and of the medical apparatus, transportation and supply were very satisfactory, including the supply of preserved blood for blood transfusion. The conditions on the steppes were very favorable for motor transportation, so that wounded men could be delivered to the field hospital 75 km. from the front line within from ten to fifteen hours after injury.

A brief review of the surgical work accomplished in the different units and of the evacuatory facilities follows. The so-called battalion medical unit (B.P.M.) did not really exist as such. It consisted of the battalion physician and his subordinate medical instructors and porters, who dragged the wounded soldiers from the firing line on canvas. Carrying the wounded would be too difficult and dangerous. In the trenches and on the field of battle during offensive maneuvers, by day and at night, and under rifle and artillery fire and air attacks, the wounded were located as quickly as possible, and after the application of dressings and provisory splints were carried away as rapidly as possible. For this purpose ambulances were brought as close as possible, sometimes to within 1½ or 2 km. from the firing line. The wounded were promptly delivered to points designated where they could be properly cared for.

The next higher unit was the Regimental Medical Unit (P.P.M.) situated in a movable tent, from 3 to 6 km. from the firing line. Here the wounded were classified and prepared for further transportation by means of transportation splints, injections, and first aid. No operations were performed in this unit. Major surgical operations in the form of emergency interventions could be performed only in the next higher unit, the movable field hospital of the Divisional Medical Unit (D.P.M.). This was from 5 to 10 km. from the firing line, but still within range of the artillery. During offensive maneuvers the distance was increased to 25 km.

The Divisional M.P. consisted of a series of tents—for classification of the patients, with two adjoining tents, one for preparation and one for operation, and tents accommodating from 25 to 30 stretchers for patients whose conditions were hopeless after operation. As a protection against air attack, the tents were buried deep in the earth and covered with grass. In many cases, urgent operations—laparotomies and trephinations—could be performed three or four hours after the injury. The tents were electrically lighted. However, the flies and mosquitoes constituted a pest for which no radical cure was known. Bandages, laundry, and operating gloves were always available in sufficient quantity. Much time was lost in preparing the patients for operation, especially in hair-cutting and shaving of the head in head injuries as the hair was usually matted with blood and soiled with sand. This soon dulled the hair-cutting machines and razors, which further hampered the work. It was suggested that the mobilized barbers be detached to the operating and dressing rooms and, furthermore, that the entire personnel be instructed in hair-cutting and shaving. Most of the wounded men, however, were transported to the movable field hospitals (P.P.G.) which constituted the chief center for surgical and operative treatment.

This was situated far, about 75 km., from the firing line, and from 50 to 60 km. from the D.P.M., and had 200 cots fastened to earth elevations. The operating tent had 4 operating tables which were in constant use day and night. Top and lateral lighting were supplied by electric lamps with reflectors. Owing to the danger of attack from the air, all the tents of the P. were buried deep in the earth and camouflaged. The chief surgical work consisted in primary wound excision without suture; immobilization of limbs in wounds of the bones and other injuries with the use of Kramer splints and Dietrich transportation splints for the legs; operations for injuries of the large body cavities, and other important interventions. In these hospitals there were, in addition to the competent surgeons, other specialists (neurologists, roentgenologists, psychiatrists, stomatologists, and anatomical pathologists) in order that necessary advice and special help was at hand at all times and could always be given. Plaster-of-Paris was not used as a rule except in rest periods when it was possible to watch the patients for a few days. The wounded were evacuated after treatment in trucks and planes and those that could not be moved remained, such as those with secondary shock, those operated upon in the large cavities of the body, and those with complicated injuries of the extremities, such as hemorrhage and gas-bacillus infection.

The terminus of the Army Medical Organization is the Chief Evacuation Department (G.O.P.E.P.). Preferably, such units should be situated near a

railroad, but under conditions like those on the steppe, it was located from 700 to 800 km. to the next railroad station. In case of the more slightly wounded, this distance was covered in ambulances or ordinary trucks. The dangerously wounded were generally satisfactorily transported within two and one-half to three hours in planes, at first in ordinary Douglas planes, which later were reconstructed into convenient ambulance planes. Besides the dying, also the most serious cases were transported by plane.

The chief division of the Evacuation unit of the army was a large well equipped hospital, in which all the wounded from the front whether injured slightly or seriously, were concentrated. Most of the wounded were redressed and sent on by rail. Only patients with complications remained. In a series of such cases operation was imperative; otherwise surgical treatment was not necessary.

So-called reinforcement groups were found valuable. They consisted of an experienced surgeon, a young junior assistant, 2 nurses (1 surgical and 1 anesthetic) and 1 or 2 orderlies, supplied with an operating table, the necessary instruments, and a tent for the operated patients. These movable reinforcement groups were called to duty and undertook a portion of the operations during major engagements in places where the wounded soldiers became congested.

The personnel gave best service when it was divided into certain permanent brigades with opportunity for resting and sleeping not less than six consecutive hours daily. The institution of twenty-four hour shifts of uninterrupted duty did not prove satisfactory. It is noteworthy that not a single case of tetanus developed.

(J. KORNMANN). EDITH SCHANCHE MOORE.

Cairns, H.: Gunshot Wounds of the Head in 1940. *Roy. Army Med. Corps, Lond.*, 1941, 76: 12.

Cairns has studied with careful detail 29 patients with gunshot wounds of the head, these casualties having arisen in the present war. He divides his cases into non-penetrating wounds (scalp wounds, and local fracture with intact dura mater), and penetrating wounds (depressed fracture with a dural tear, penetration of the brain by fragments of bone, penetration of the brain with fragments of bone and metal, and craniocerebral-orbital injury). He points out that frequently war wounds do not present the clinical syndrome of concussion with the symptom of loss of consciousness at the time of injury. In fact, 23 of his 29 cases did not show such a symptom, and he poses several interesting questions as to why this may be true. He also points out that there is frequently, after gunshot craniocerebral wounds, a fortunate tendency of such injuries to undergo spontaneous improvement, and even complete recovery of the patient may ensue. The author does not support the old theory that the foreign body must be removed to diminish the liability to epilepsy. He does believe that careful débridement, cleansing, and clot removal are necessary, but decries unnecessary fishing about in the cerebral contents simply to remove a piece of metal. Modern warfare with its smaller, high-velocity missiles, chemotherapy, and other factors may have an important bearing on the fact that injuries in this war do not frequently result in infection and massive clot formation.

Special emphasis is placed on the necessity for thoughtful meticulous care of all head wounds. Wide shaving, excision of non-viable tissue, the gentlest manipulation of the cerebral tissue itself, thorough irrigation with warm saline solution, and suture of the galea and skin with interrupted silk sutures are each in themselves matters of the greatest importance. "From the point of view of conserving man power, the operation of cleaning and closing a scalp wound is much more important than the operation of removing a foreign body from the brain." Where operating conditions are bad, it is best to apply sterile dressings and move the patient back to a zone where careful attention may be given to the wound, since scalp wounds may be cleansed, excised, and sutured three days or more after injury if proper facilities are at hand. The author's final statement is significant: "The apparently trivial operation of cleaning and suturing a wound of the scalp is probably the most important neurosurgical operation of war." JOHN MARTIN, M.D.

Hauenstein, K.: Practical Experiences and Critical Considerations in the Treatment of Gunshot Wounds of the Jaw (Praktische Beobachtungen und kritische Betrachtungen bei Behandlung Kieferschussverletzter). *Deutsche Zahnaertzl. Wchnschr.*, 1940, p. 615.

Gunshot wounds of the jaw are so diverse that treatment methods do not lend themselves to standardization, but must follow a different course from case to case, appropriate to the individual condition encountered. The experience gained from such individual cases is extremely instructive, and, therefore, Hauenstein reports a number that are especially outstanding, and presents instructive photographs and roentgenograms.

The first case was that of an injury to the left half of the face by a shell splinter. The most striking aspect of this case was the fact that all of the primary suturing of the soft parts had to be removed, while the wire splint which had been applied at the field hospital could be left in place. The sunken floor of the orbit was successfully elevated by Wassmund's method, a tamponade of the maxillary sinus. The double vision was corrected. Interrupted suture of the soft parts with drainage of the secretions through the oral cavity was done later. A separate cheekplastic was not necessary.

The second case was similar to the first. Here again the sunken eyeball could be elevated by tamponade from below. Suture of the cheek following painstaking union of the separate muscular layers was complete except for a small salivary fistula. The locked jaw was gradually forced open and elevated

by gradually increasing the thickness of a block of guttapercha which was fixed to the lower guttapercha plate.

The third patient presented severe destruction of the bone and soft parts of the lower jaw which was caused by a rifle bullet. The treatment by primary suture and flap-plastic, which was initiated in the field hospital and continued in a base hospital, failed completely. The tongue was sunken backward and adherent to the floor of the mouth. Respiration was possible only in the sitting posture. The difficulty of splinting the lower jaw was finally overcome with a strong Schroeder bandage and a mandibular prosthesis. It was only then that attention could be turned to the face plastic. This was accomplished by means of flap formation from the region of the under jaw and broad-pedicled flaps from the neck. The defect in the red of the lips was corrected at a second operation. Later, the ends of the mandible were freshened and healing was obtained by means of splint-fixation.

The sooner these splintered fractures are brought to the department of oral surgery (jaw-hospital), the better will be the results, since it is only here that it is possible to undertake the frequently extremely complicated splinting procedures.

Sustaining therapeutic means are recommended, such as heat, light, irradiation, prontosil, trikalkol, and cantan. (Gerlach). John W. Brennan, M.D.

Hadfield, G., and Christie, R. V.: A Case of Pulmonary Concussion ("Blast") Due to High Explosive. *Brit. M. J.*, 1941, 1: 77.

A case of hemorrhagic pulmonary concussion, a relatively new clinical entity which has developed and which has been studied only recently, is described in detail with clinical course, treatment, and careful post-mortem examination in this article. A soldier, aged twenty-three years, was sleeping in a wooden hut on which a bomb fell and exploded. Symptoms of shock, dyspnea, cyanosis, and pain in the chest and abdomen were present and examination disclosed scattered râles throughout the chest. The abdomen was tender and rigid. There was a slight elevation of temperature and pulse rate and the respiratory rate was 30 per minute. Sedatives and oxygen were administered. There appeared to be a gradual improvement in the condition. Roentgenograms of the chest showed a diffused mottled, woolly shadow throughout the left lung and the midzone on the right lung. The patient was transferred to another hospital and his condition gradually became worse, with two encouraging remissions, but he suddenly had a sinking spell and expired fifty-one hours after his injury.

A post-mortem examination was performed which disclosed no extensive signs of injury except a small superficial abrasion of the chest wall. The upper air passages contained a moderate amount of blood-stained frothy fluid.

The pericardial fluid was slightly blood-tinged. There were some petechial hemorrhages between the parietal pleura and the thoracic wall. Both lungs were large. At least two-thirds of the left and half of the right lung were consolidated. All these lesions were shown to be continuous with large foci of deeply seated resolving hemorrhage. The central portions of the consolidation were dark venous blood clots, but the indefinite edges were bright red.

Histological examination of the lungs demonstrated widespread intra-alveolar capillary hemorrhage. The outline and structure of the alveolar walls was preserved and were tightly packed with partly hemolyzed red blood cells.

The findings led the author to believe that this condition is caused by grossly dilated capillary vesicles. These appear to be a rather constant sign in cases of hemorrhagic pulmonary concussion due to detonation of high explosives in the vicinity of the injured. In the discussion of the case some suggestions as to treatment of people injured in this manner are given. J. E. Tremaine, M.D.

Thomas, C. P., Livingstone, J. L., Barrett, N. R., Roberts, J. E. H., and Others: Discussion on Chest Injuries. *Proc. Roy. Soc. Med.*, Lond., 1940, 34: 83.

Thomas stated that despite the low total incidence of chest wounds, there is an extremely high mortality rate, and, among those who die before there is any question of medical aid, chest wounds rank high in the list. Chest wounds are heir to all damaging effects of wounds in other regions—shock, hemorrhage, and sepsis. In addition, there are other factors to which this high immediate and late mortality can be attributed.

These factors are dependent upon the interference with the patient's cardiorespiratory reserve. The conditions producing this interference are:

1. The presence of either air or blood in the pleural cavity under sufficient pressure to encroach not only on the homolateral but also on the contralateral lung as a result of the ensuing mediastinal displacement; at the same time this displacement produces severe cardiac disability, chiefly by inefficient filling as a result of distortion of the superior and inferior venæ cavæ.

2. The ill effects of open pneumothorax, briefly stated, are: (a) lung collapse on the affected side; (b) pendelluft, that is, the pendulum swing of air during respiration from the expanded to the collapsed lung and *vice versa;* (c) mediastinal flutter, the paradoxical swing of the mediastinum during inspiration, with the stimulation of the contained cardiac and pulmonary plexuses; and (d) the loss of aspiration on the great veins, which leads to deficient diastolic filling of the heart and in turn to a deficient cardiac output.

3. Cardiac tamponade results from fluid in the pericardial sac constricting the heart and preventing efficient diastolic filling. In these cases the fluid accumulates rapidly before the pericardium has time to stretch; consequently a relatively small quantity of fluid is enough to produce a fatal outcome.

All these factors operate more seriously in the old than in the young. The young person's vital capacity has not been impaired by pulmonary disease or factors limiting efficient expansion of the thoracic cage, such as calcification of the costal cartilages or osteo-arthritis of the costovertebral articulations. Also, his cardiovascular system has not yet felt the strain of life.

The factors discussed, together with those common to all wounds, such as shock and hemorrhage, and the question of morbidity, both early and late, are the considerations when one is called upon to treat any of these cases.

In combating shock, it is established that the rapid replacement as early as possible of the circulating colloids will cut short the period of peripheral anoxemia, the factor leading to damage of the capil lary bed.

Hemorrhage presents the same problem here as in other parts of the body, except that here, as in the abdomen, considerable blood loss may occur without evidence.

Patients who die during the first forty-eight hours, die as a direct result of the factors already mentioned. Those who survive this period only to succumb later do so as a result of sepsis, most commonly pleural or pulmonary, or a combination of both. Sepsis results from the presence of a retained foreign body, badly lacerated and dead tissue, and conditions which are favorable to the further growth of the infecting organisms. The pleural cavity with a hemothorax provides an ideal culture chamber for such a process, and our aim, when practicable, should be to remove not only the nidus, but also the culture medium and the hemothorax, and to induce expansion of the lung at as early a stage as it is possible to obliterate the pleural space. One other cause of late morbidity is the inefficiently treated hemothorax which, when left, organizes and forms a mass of fibrous tissue which may later become calcified, and thus prevents effective expansion of the lung. This disability becomes obvious only in later years when other factors lowering the vital capacity become operative.

Both anteroposterior and lateral x-ray films are necessary to localize opaque foreign bodies to reveal either a hemothorax or pneumothorax, as well as injuries to the bony cage. If possible, one anteroposterior film should be a penetrating one, as it is quite easy to miss a foreign body completely when it is overlaid by the heart and vertebral or diaphragmatic shadows, or by a hemothorax.

Experience has repeatedly shown that operation (when indicated, and the patient's condition will allow) should be done within the six-hour interval immediately following the infliction of the wound if the best results are to be obtained.

Definite indications for operative intervention during the six-hour interval, if the patient's condition will permit, are: (1) wounds producing an open pneumothorax, more graphically called sucking wounds; (2) hemorrhage which is overt and progressing; (3) hemothorax with a retained foreign body; (4) hemothorax where there is reason to suspect, from the direction of the injury, the position of the foreign body, or other radiological or clinical evidence, that the diaphragm, heart, or pericardium has been injured.

The cases which will not need operative intervention are: (1) through-and-through wounds without hemothorax or hemoptysis; (2) through-and-through wounds in which the entry wounds do not constitute sucking wounds, even in the presence of a hemothorax.

Complete surgical revision of both entry and exit wounds is essential. It is well to note that there may be an entry and an apparent exit wound with the foreign body still inside of the chest, the exit wound having been made by rib fragments blown through the chest wall. The revision should be carried down to the pleura, and the fractured ribs should be resected to leave clean sound surfaces, all loose bony fragments being removed. The author has been constantly faced with cases in which excision has been done and this important part omitted. If one of the wounds is situated at a place convenient for thoracotomy, this should be enlarged and the chest entered at this site, but the temptation to explore through an ill-placed incision should be avoided at all costs. An intercostal incision is preferable, but there is no objection to entering through the bed of a resected rib, as the gap can be closed with pericostal sutures. In young patients with flexible chest walls, a simple intercostal incision is all that is necessary, as the space can be spread sufficiently with a good rib spreader. In older people it is wiser to resect a small segment of the rib above the space at its posterior end and, if necessary, doubly ligate and divide the intercostal vessels and nerve. A thoracotomy opening of from 6 to 7 in. long is usually ample, but there should be no hesitation in enlarging it if this proves to be insufficient. To prevent wound contamination the whole thickness of the wound should be covered with warm flavine packs which are efficiently kept in place by the double rib spreader. The chest is now emptied of blood and clots, preferably with a sucker which prevents trauma to the pleura, associated with swabbing. The lung, mediastinum, pericardium, diaphragm, and chest wall are then inspected.

The lung is the commonest site in which to find the retained body. It can usually be easily palpated, but in some cases in which there is also a large hematoma in the lung it may not be easy. The degree of lung laceration and the site of the foreign body are ascertained. With larger ragged foreign bodies the degree of laceration may be severe and, if so, it is probably wiser to resect the lobe if the patient's condition will permit. Simple removal of the foreign body in these cases inevitably leads to a prolonged period of chronic sepsis and illness. If the foreign body is situated in a fringe of the lung, wedge resection of the lung including the track of the foreign body gives the best results. In a large number of

cases, however, simple removal of the foreign body will be all that is possible.

While removing foreign bodies close to the hilum great discretion should be used, and unless the surgeon is prepared to face a lobar resection or difficult ligation they are best left alone. The presence of a lung hematoma does not call for resection, but most certainly calls for removal of the foreign body. These cases, even without a retained fragment, may suppurate, and they most certainly will if a fragment is retained. In certain cases the lung may be adherent to the chest wall at the site of injury. This type will come up for operative intervention only when the foreign body is large and there is a good deal of chest-wall destruction. Adhesion of the lung will be suspected in the absence of a hemothorax or pneumothorax, and in these cases the pulmonary condition will be dealt with during surgical revision of the wound, which includes the removal not only of the foreign body, but also of the bone fragments, which are apt to be overlooked. The wound is then packed as it is in dealing with a lung abscess, and not sewn up.

Unless the foreign body presents itself easily in the mediastinum, it is best left alone. Foreign bodies in this wall rarely give trouble in later years.

Blood or a wound in the pericardium needs investigation. The pericardium should be opened in front of or behind the phrenic nerve, or in the line of the opening, the edges of which are excised. The sac is aspirated clean, and the heart chambers are examined. In the case of cardiac wounds, a free flow of blood will continue after the sac is opened, and this can be controlled by one of the various maneuvers, while the wound is sutured. The pericardial wound should then be closed.

A wound of the diaphragm should be enlarged in a radial direction and the subdiaphragmatic area examined. In cases in which no clinical evidence of abdominal damage exists, there is no need to make an extensive examination. When abdominal injury is strongly suspected, a wider incision is indicated and it may be necessary to continue the thoracotomy incision through the costal margin, or do a separate laparotomy. In all cases, however small the incision, the diaphragmatic deficiency must be closed, as even from the smallest puncture a sizable diaphragmatic hernia may result later.

In cases in which the exit wound has not been caused by the foreign body itself, but rather by the rib fragments, the foreign body will often be found in another pocket in the chest wall and should be removed when accessible. No elaborate operative removal should be embarked upon, however, as if it has passed outside of the pleura it is probable that it will cause no further trouble. All the intrapleural manipulations being finished, the pleural cavity is flushed with a warm, weak acriflavine solution if no big fistula is present, and sucked dry, and the chest wall is closed in layers, with pericostal sutures to approximate the ribs. The practice of plugging wounds of the chest wall cannot be too strongly condemned; it inevitably leads to sepsis and infection of the pleural cavity. If the pleura is closed and the wound sutured, infection of the chest-wall wound a few days later does not necessarily mean a pleural infection. If an intercostal trocar is not available a tube is introduced through an intercostal space.

The dressings are fixed with strapping which is carried just over the midline anteriorly and posteriorly. This maneuver not only supports the side which has been operated upon, but also allows a free expansion of the sound hemothorax. On the patient's return to bed, the intercostal catheter is attached to an empyema bottle, which provides water-sealed drainage. In uncomplicated cases, the intercostal tube should be removed in from forty-eight to seventy-two hours. The use of oxygen administered by means of a B.L.B. mask is as important after as before the operation.

LIVINGSTONE stated that severe internal injury may be present without any external sign and the size of the entry wound is no guide in this respect; one should try to visualize the course of the missile, when possible. Wounds of the lower chest may be associated, at the time or later, with sudden onset of abdominal rigidity, exactly simulating acute peritonitis and a laparotomy may be necessary.

Complications are frequent and may be easily overlooked; close observation, checked by roentgenograms from time to time, is required. Local complications included collapse of the lung or lobe, with or without infection; spontaneous pneumothorax; bronchial fistula; hemorrhage; infection of a previously sterile hemothorax; lung abscess and pneumonitis; simple or infected effusions of the sound side; and subphrenic abscess and pericarditis, infected or "sympathetic." Typical pneumonia was not seen, though cases of infection in collapsed lobes might be easily mistaken for this. General complications were acute dilatation of the stomach (6 cases); metastatic abscess in hip and brain; meningism; thromboses; edema and nephritis.

BARRETT stated that there are two main groups of wounds. The first involve the superficial tissues and are straight-forward, because their effects are limited to the chest wall; the second include fractures of the ribs and open pneumothorax, and are dangerous if the functions of the heart and lungs are disturbed.

Wounds of the muscles and superficial tissues are generally easy to handle; large parts of the muscles of the pectoral girdle can be removed without loss of movement of the arm, and infections respond well to treatment.

The most serious injuries are those which involve the muscles of the back and shoulder.

With fractures the mechanical stability of the thoracic cage is often so impaired that a special element of risk arises on this account.

In the case of simple fractures, the surgeon is not concerned with the question of reduction or union; their importance lies rather in the fact that the movements of breathing may be limited by pain or rendered ineffective by an unstable chest wall.

To control the pain of fractures in the lower chest the skin should be shaved and strapping applied horizontally from points beyond the midline in front and behind. The object of this treatment is to prevent movement and, consequently, a wide area should be covered and the adhesive put on from below upward with the chest in full expiration.

The other indication for immobilizing a part of the chest is less well known; it is "paradoxical movement," a condition which occurs when a series of adjacent ribs have been fractured, or removed surgically, so that the chest wall is unsupported. In such cases the affected part does not move with the rest but is sucked in during inspiration and blown out during expiration, and this causes dyspnea and cyanosis because the cardiovascular system and the mechanics of respiration are disturbed. Treatment aims at padding and strapping the unstable part so that it no longer moves.

Another group of wounds, which are serious on account of their liability to disturb the cardiorespiratory systems, is that called "sucking wounds." These wounds are so grave that they color the whole picture of traumatic thoracic surgery, and it is generally true that the life of the patient hangs upon their treatment.

Sucking wounds should be closed because the condition of the patient is at once alleviated by any treatment which prevents air being sucked in and out. The reason for the improvement which occurs is not clear at first sight, since it is known that under certain conditions an open pneumothorax is not dangerous in man. A wide thoracotomy can, for instance, be performed in some patients under local or spinal anesthesia. Some men who were evacuated from Dunkirk without treatment were alive five or six days later in spite of an open wound of the pleura. The explanation of these apparent anomalies lies in the fact that in man during quiet respiration, an open pneumothorax does not embarrass the circulation or the respiration beyond the points of their reserve. If the burden of shock, painful respiration, hemorrhage, bronchial obstruction (by blood or secretions), or sepsis is added to an open pneumothorax, the result is immediately serious.

The best way to close an open pneumothorax in an emergency is to cover the wound with a pad, and it is convenient to carry a standard dressing for this purpose; it consists of a piece of mackintosh tissue to one side of which several layers of vaseline gauze have been sewn. This dressing should be strapped over the wound.

If the patient is seen soon afterward and resuscitation has been successful, the pad should be taken off, and the wound carefully and thoroughly excised and then closed by suture of muscle and perhaps skin. In every case an intercostal catheter should be inserted, because whenever the pleura has been opened by trauma it is liable to infection and also because a transient blood-stained effusion is common. Closed drainage with a water seal should be maintained for about forty-eight hours.

If the wound is large and cannot be closed by muscle or skin after excision it must be covered and rendered airtight with a large pad of vaseline gauze, and the pleural cavity drained as before. The prognosis is, of course, influenced by the size of the defect in the chest wall, but patients with large wounds sometimes get well, particularly if the lung has not been damaged and can be sewn to the surface at the margins of the gap. In such cases plastic operations on the chest wall will be necessary later on.

When infection is already established or probable, an open wound of the pleura must still be "closed," but the meaning of the word is now particular. The wound must be left surgically open so that pus and exudates can escape, but closed with an air-tight dressing.

ROBERTS said that a considerable number of cases of blast had now been studied. Some of the patients did not develop serious symptoms for forty-eight hours. The blast was in many cases a progressive lesion; capillary bleeding into the lung went on for several days. Professor Hadfield had made post-mortem examination in 38 cases of blast, in some of which death had taken place immediately, while in others there had been survival for several days. It was quite clear that the length of time after the blast injury before death occurred had a direct relation to the amount of hemorrhage in the lung. Some of the cases seen at the hospital showed punctiform hemorrhages in the skin of the abdomen and chest. If such a condition, which was not very easily seen, was observed, it might be assumed that the patient was suffering from blast until the contrary was proved. Some of the patients had severe abdominal symptoms with little to draw attention to the chest, and gross rigidity and tenderness of the abdominal wall, with no shifting dullness in the flank or absence of liver dullness. Roberts had knowledge of 2 of these cases, in which a laparotomy was performed without any lesion being found, and it was possible, although there was as yet no proof of it, that these symptoms were due to the hemorrhages into the muscles of the abdominal wall which were similar to those into the intercostal muscles. Less severe degrees of abdominal rigidity were common. Some of the post-mortem examinations had shown the intercostal muscles to be infiltrated with blood. Blast, therefore, should always be borne in mind in dealing with any group of bomb-wounded people. Roberts believes that no operations should be performed under a general anesthetic until it is shown whether the blast of the lung has been progressive. Blast had been overlooked in many cases because its presence was not suspected. The addition of a general anesthetic to the already existing lesion was not conducive to the recovery of the patient. JOHN J. MALONEY, M.D.

Nordentoft, J. M.: Some Cases of Soldier's Fracture. *Acta radiol.*, 1940, 21: 615.

The author reports 4 cases of fractures, 2 of them in the distal end of the femur and the other 2 in the tibia. The patients were young men, who during

their military service developed bone lesions which by roentgen examination showed the onion-peel characteristics and were suspected of being Ewing's sarcoma. The 4 patients' ages were from nineteen to twenty-four years. After a relatively short time in military service they developed pain and disability in the femur or tibia which followed strenuous military service to which the patients had not previously been accustomed. There was no preceding history of trauma.

Roentgen-ray examinations of the involved bones showed that there was definite periosteal reaction with a very marked stratiform appearance which suggested the onion-peel characteristics of an Ewing's sarcoma. No fracture lines were visible. The adjacent joint movements were within normal limits. There was no enlargement of the regional lymph nodes. The Wassermann examinations were negative. The microscopic examination of biopsy specimens showed the tissues to have the characteristic of callus. There was no evidence of sarcoma. This lesion resembled a similar condition which has been reported in the metatarsals, the tibia, the fibula, the neck of the femur, and the pelvic bones.

These cases were found to be of no great importance. The sites of the periosteal thickening or fracture must be immobilized for a considerable period of time, the most satisfactory method being by means of a plaster-of-Paris cast. The point greatly stressed and to be remembered is that this type of insidious fracture occurring especially in soldiers has all the characteristics of Ewing's sarcoma. In some cases the diagnosis is so much in question that a biopsy is the only means of differentiation.

RICHARD J. BENNETT, JR., M.D.

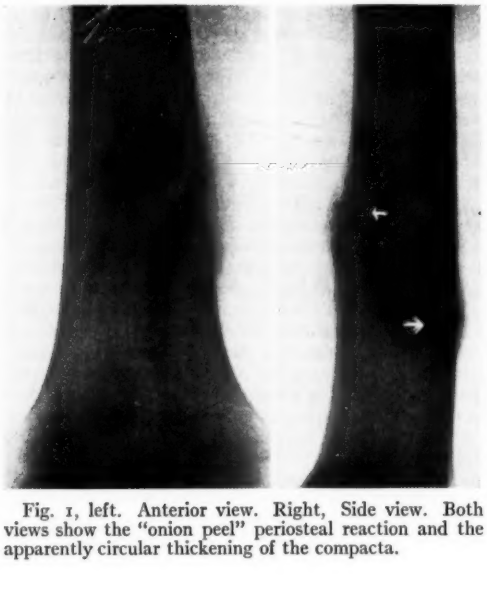

Fig. 1, left. Anterior view. Right, Side view. Both views show the "onion peel" periosteal reaction and the apparently circular thickening of the compacta.

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Tsvetkov, V. P.: Roentgenoscopic Aspects of Postoperative Pulmonary Complications in Relation to Their Genesis. *Vestnik khir.*, 1940, 60: 3.

This article is based on observations of 120 postoperative pulmonary complications, 75 per cent of which occurred in men and 25 per cent in women. In an overwhelming majority of cases the changes in the lungs followed laparotomies. Thirty-three per cent of all operations were performed under spinal anesthesia, an equal number under local anesthesia, 17.3 per cent under general anesthesia, 12.9 per cent under a combined local and general spinal anesthesia, and 0.54 per cent under intercostal anesthesia. Thirteen and four-tenths per cent of the cases occurred during March, May, and November, and 9.9 per cent in January and September, while only 2 per cent developed in August and 2.4 per cent in July. The author concludes that there is no definite relationship between the time of the year and the frequency of postoperative pulmonary complications. In 52.1 per cent of the cases the temperature ranged from 102.2 to 104 degrees F.; in 36.8 per cent from 100.4 to 102.2 degrees F.; and in 11.1 per cent from 98.6 to 100.7 degrees F. A dullness on percussion was present over the lower portions of one or both lungs in 90 per cent of the cases; cough occurred in 21.6 per cent, and pains in the chest in only 8.9 per cent. Sputum was raised in the early stages of the complication by 10.9 per cent of all the patients.

The clinical symptoms often did not correspond to the roentgenological and pathologico-anatomical findings. The most frequent type of postoperative pulmonary complications was a pneumopathy located in the lower portions of the lungs which produced variable physical findings not exactly identical to those caused by a lobar or bronchial pneumonia. In spite of identical clinical symptoms, the pneumopathy furnished different findings in various cases, viz.: (1) a normal picture of the lungs, (2) increased hilus markings on one or both sides, (3) a circumscribed focus in the region of the cardiodiaphragmatic angle or some other place, (4) a homogenous hazy appearance of the lungs adjoining the diaphragm, and (5) bronchopneumonic foci.

The discrepancy between physical and x-ray findings is due to the fact that the first are caused by a reaction of the pulmonary tissue, especially hyperemia, which may or may not produce shadows in roentgenograms, as this depends on the amount of exudate and absence of air. Signs of pneumopathy may already be absent when the patient dies and therefore the autopsy may fail to disclose it, while in other cases the same condition may be transformed into a lobar or bronchial pneumonia. Hence, the post-mortem findings may not correspond to the clinical symptoms.

Less frequent postoperative pulmonary complications are aspiration pneumonia, atelectasis, pneumonia of an embolic origin, obturative emphysema

combined with atelectasis, and caseous pneumonia developing on the basis of a pneumopathy.

JOSEPH K. NARAT, M.D.

Kekwick, A., Marriott, H. L., Maycock, W. d'A., and Whitby, L. E. H.: Diagnosis and Treatment of Secondary Shock; A Study of 24 Cases—Primary and Secondary Shock—Assessment of Severity—Treatment and Assessment of Recovery—Hematological Aspect. *Lancet*, 1941, 240: 99.

The summaries of 24 cases of injury from air raids with shock are presented. Whitby and his associates believe that had it not been for the promptness with which the patients were treated, most of them would have died. In the presence of these severe injuries the onset of symptoms of shock appears to be rapid, and the cardinal sign of the condition, a sustained and serious lowering of the blood pressure, is well established within a few hours. Primary shock due to psychogenic and neurogenic influences is common among air-raid casualties which reach the hospital soon after injury, and lowered blood pressure, sweating, pallor, and thirst may be noted. Differentiation from secondary shock is wisely made by allowing a period of observation, during which rest in the recumbent position is combined with warmth and morphia, unless the nature of the wounds makes it obvious that the patient must have suffered the reduction in blood volume which is the cause of the lowered blood pressure. Blood pressure should be taken every fifteen minutes and if at the end of an hour it is still below 100 mm. Hg., some degree of secondary shock is probably present and transfusion should be done without delay. The 24 cases presented emphasize that in the earlier phases a blood-pressure reading is the only reliable measurable observation and that the pulse rate does not always rise as the blood pressure falls. Therefore, the pulse rate is unreliable. The mental state, pain, color changes, sweating, and general body temperature bear no quantitative relationship to the degree of severity of shock.

Since the symptoms of secondary shock are caused largely by the gross reduction in the blood volume, the obvious treatment is to restore the blood volume. Information is required as to the best fluid to use for the purpose, when to transfuse, in what amount, and at what rate. Transfusion of blood or plasma should be carried out without delay on those with serious wounds and dangerously low blood pressure, on those whose pressure does not return to 100 mm. Hg within an hour of routine resuscitation, and on those whose blood pressure, observed at fifteen-minute intervals, continues to decline during the resuscitation hour. A rise from 10 to 20 mm. Hg is obtained after each 540 c. cm. that are transfused, and in order to obtain a systolic pressure of 100 mm. Hg or over, it is necessary to transfuse not less than 50 per cent of the calculated blood loss, which may amount to from 1,000 to 3,500 c.cm. in severe cases of secondary shock. If this rise does not occur, or is not maintained, continued bleeding should be suspected. The amount to be transfused should be governed by the blood-pressure response. Serial hemoglobin or hematocrit determinations to permit the calculation of blood volume are accurate indices, except in the presence of continued bleeding, when they cause under-estimation of the blood loss in proportion to the amount of bleeding. As to rate, the first two 540 c.cm. bottles should be administered rapidly, each bottle occupying about fifteen minutes. If this produces the anticipated rise in blood pressure, the rate for administering more can be judiciously slowed.

Plasma and blood are equally effective for restoring the blood volume. The plasma used was from ten to fifty-six days old. While chills were observed with the administration of plasma in 3 cases, investigation of these cases showed that in none could the chills be attributed to old plasma, opalescent plasma, plasma with clots, or refiltered plasma. When the amount of fluid needed reaches three 540 c.cm. bottles or more, at least one bottle in three should be blood. It is not likely that sufficient citrate to cause a dangerous alkalosis could be given in the form of stored blood or plasma.

An approximately quantitative replacement of lost fluid is required. At least half of this should be protein fluid, otherwise the restoration of blood pressure will be temporary and an operation will not be well borne. Transfusion should continue during any delay before operation as well as during operation, especially if more blood is apt to be lost at that time.

EDWIN J. PULASKI, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Agostinelli, E.: The Treatment of Compound Fracture (Contributo alla terapia delle fratture esposte). *Policlin.*, Rome, 1940, 47: sez. prat. 1742.

The question of primary closure of compound fracture after débridement from time to time arouses discussion. The author reviews the literature and states that Fabiani in 1884 was the first to practice this method. He notes that Fontaine (1934) had recoveries in 82.62 per cent of 127 cases. Arnaud (1931) asserts that with primary closure the mortality is greater than with conservative treatment (disinfection and immobilization). Furthermore, Baldwin and Gilmore reported 7 cases of gas gangrene due to deficient sterilization of the wound in primary closure of compound fracture. Magliulo maintained in 1936 that primary closure was the ideal treatment of compound fracture but that delayed primary suture was safer. The author prefers careful débridement of the wound followed by thorough disinfection, reduction of the fracture, and application of a plaster cast with a window for daily dressings of the wound. More recently the author has used cod-liver-oil gauze dressings on alternate days in taking care of the wound. The invasion of pyogenic organisms is prevented in this way and epithelization oc-

curs more rapidly. The use of olive oil instead of cod-liver oil has not given the author the same results.

The author briefly reports a series of 6 cases of compound fracture treated in this manner with very favorable results. However, the author admits that in a larger series the statistics of recovery would not be so favorable. He calls attention to the 1938 statistics of Klager who in a series of 302 such cases had a total mortality of 6 per cent and was forced to perform amputations in 16 per cent of the cases.

JACOB E. KLEIN, M.D.

Nostschinski, V. R.: Subpectoral Phlegmon. *Vestnik khir.*, 1940, 60: 18.

Acute suppurative processes developing in lymph nodes of the subpectoral region cause a moderate general reaction in the majority of cases and subside under conservative treatment or following superficial incisions. In a smaller number of cases the local and general symptoms are more pronounced, while in a limited number of instances an acute febrile condition with hardly noticeable local symptoms dominates the clinical picture. Deeply located subpectoral phlegmons belonging to the last-mentioned group may be confused with influenza, pneumonia, typhoid fever, and acute articular rheumatism.

The diagnostic difficulties may be responsible for a delayed exposure of the infectious focus. Such a delay may create great technical difficulties in performance of the proper operation and threaten a loss of life. If an acute septic process with an obscure location of the primary focus is present, one should think of a subpectoral phlegmon. One of the earliest signs is a painful contraction of the pectoralis major muscle, comparable with the rigidity of the abdominal wall in the presence of pathological processes within the peritoneal cavity. The spastic contracture of the muscle is responsible for a limitation of motion of the shoulder. An ascending infection, starting in superficial layers of the distal portion of the upper extremity, is the main etiological factor. Therefore, in doubtful cases the attention of the surgeon should be focused on minor injuries of the fingers, wrists, or forearms.

The most frequent micro-organisms found in such conditions are staphylococci but in grave cases hemolytic streptococci have been demonstrated. The infection spreads through the lymph vessels and reaches the angulus venosus. This mode of dissemination of bacteria is responsible for prolonged septic symptoms. In addition to dull pains and indefinite swelling in the pectoral region, supplemented by an adduction contracture of the shoulder, the author noticed in many cases also the presence of two painful circumscribed areas: one immediately below the clavicle, 1 cm. median to the anterior axillary line, and a second at the level of the second intercostal space, slightly lateral to the medioclavicular line.

An early and deep incision is the method of choice in the treatment of deep subpectoral phlegmons. The incision is carried parallel to the external border of the pectoralis major muscle. Pus may be found immediately beneath the pectoralis major muscle, beneath the pectoralis minor muscle, or in both locations.

JOSEPH K. NARAT, M.D.

Nikonova, O. N.: Subpectoral Phlegmons. *Vestnik khir.*, 1940, 60: 32.

In the course of ten years the author treated 1,449 patients with suppurative conditions; among them were 596 cases of phlegmon, in 43 of which the phlegmon was located in the subpectoral region. Twenty-nine of the patients were men and 14 were women. The phlegmon was found on the right side in 23 cases and on the left side in 20. The most frequent pathogenic micro-organisms found were streptococci and staphylococci. In chronic cases tubercle bacilli were usually present and the process originated in the ribs. The predisposing factors are direct trauma or an overextension of the pectoral muscles with resulting minute hemorrhages. Acute infectious diseases may also lower the resistance of the patient and thus contribute to the development of a phlegmon. The port of entry may usually be found in superficial injuries in the shoulder region or in the upper extremities. At the time when the phlegmon is found, the original wound may be healed. Lymphangitis or lymphadenitis of the nodes in the elbow region is found only in exceptional cases. In the presence of general malaise, chills, high temperature, and pains in the shoulder, one should think of an infection of deeply located regional lymph glands. The infection is carried from the upper extremities to the subpectoral region through superficial as well as deep lymph paths.

In view of the gravity of the condition, which is followed by a relatively high mortality, the patients should be hospitalized. The best therapeutic measure is an early incision, carried along the outer border of the pectoralis major muscle.

The differential diagnosis should consider influenza, typhoid fever, acute pleurisy, and pneumonia. Pains in the chest, dyspnea, cough, and bronchitis may suggest the two last-mentioned conditions, while nausea, vomiting, and disturbed intestinal functions may point to the diagnosis of typhoid fever.

JOSEPH K. NARAT, M.D.

Herrell, W. E., and Brown, A. E.: The Treatment of Septicemia. Results Before and Since the Advent of Sulfamido Compounds. *J. Am. M. Ass.*, 1941, 116: 179.

Enough time has elapsed since the introduction of sulfamido compounds, the authors wrote, to justify a study of the merits of these compounds in the treatment of septicemia. After exclusion of certain cases, they had left for study 155 cases of septicemia caused variously by a hemolytic streptococcus, streptococcus mitior, staphylococcus aureus, diplococcus pneumoniæ, and escherichia coli. Of these 155 cases, they selected the 103 in which sulfamido drugs had been employed and they compared the results in these

cases, not only with those in the 52 cases in which these drugs had not been employed, but also with the results in 119 similar cases encountered in the period from 1934 to 1936, inclusive, when sulfamido drugs were not available.

It is conservative, the authors thought, to estimate that use of these drugs in cases of septicemia has almost doubled the recovery rates, in general; but this does not mean that results in the presence of different organisms are uniform. In any series of cases of septicemia, by far the larger proportion is caused by the hemolytic streptococcus and the staphylococcus aureus. Fortunately these are the two microörganisms against which, in the authors' experience, sulfamido drugs have proved most effective.

Prior to the advent of sulfamido therapy, 3 factors were of great prognostic significance in septicemia. These were age of the patient, colony count on initial blood culture, and maximal leucocyte count. These factors, they found, were of reduced significance when sulfamido drugs were used. Evidence to support this statement from the authors' series of cases is that (1) among patients more than fifty years of age the recovery rate was increased sixfold; (2) approximately as many patients recovered, whether the initial colony count was low or high, and (3) the recovery rate was not substantially affected, whether the maximal leucocyte count was below or above 10,000 per cubic millimeter of blood.

The experience of Herrell and Brown indicated that in the treatment of a series of patients who had septicemia caused variously by the 5 microörganisms named in a previous paragraph, the single factor of greatest importance was adequacy of treatment. Evidence of this is that when adequately treated with sulfamido compounds, patients had a seven-out-of-ten chance of recovery as against a seven-out-of-ten chance of dying if inadequately treated. In the latter group results were no better than if sulfamido drugs had been completely withheld.

Apkaryanz, P. S.: Methods of Therapy of Gas Gangrene as Used in the Surgical Department of the Twelfth Clinical Hospital. *Nov. khir. arkh.*, 1940, 46: 319.

Of 2,370 patients with infected wounds following trauma, 34 presented gas gangrene; 24 of these were men and 10 were women. In 21 cases the lower extremity, in 9 the upper, and in 4 other parts of the body were affected. Fourteen patients were admitted not earlier than the fourth day of the disease. The mortality was 50 per cent.

Easily accessible foreign bodies should be removed from contaminated wounds, shock should be combated, and compresses saturated with hydrogen peroxide, chloramine, or potassium-permanganate solution should be applied if the patient cannot be hospitalized immediately. In addition, the involved extremity should be immobilized. As soon as possible after hospitalization, débridement should be undertaken or, if possible, the whole wound excised. After that, the compresses already mentioned should be applied.

The author also recommends blood transfusions, and an early parenteral administration of large doses of specific serum, supplemented by local applications of the same serum.

Finally, the author employs daily intravenous injections of 1.5 to 2 c.cm. of a 0.5 potassium-permanganate solution, as suggested by Voron, because the latter was able to show in experiments that this solution counteracts shock and increases the oxygen tension in the blood. JOSEPH K. NARAT, M.D.

Hamburger, M., and Ruegsegger, J. M.: Treatment of Staphylococcal Septicemia with Sulfamethylthiazole and Sulfathiazole; a Report of 12 Cases. *Ann. Int. Med.*, 1941, 14: 1137.

The authors report their experience in the Cincinnati General Hospital with 27 cases of staphylococcal septicemia during the period from 1933 to 1939, and add 12 cases treated during the past year with thiazole derivatives of sulfanilamide. Most of the patients had at least two positive blood cultures. Among the earlier group there were 7 cases of osteomyelitis, with a mortality of 57.1 per cent and among the remaining 20 the infections were of other clinical varieties, with a mortality of 95 per cent. Six patients treated with sulfanilamide, 3 with sulfapyridine, 2 with bacteriophage, and 5 with polyvalent staphylococcus serum are included among these fatalities.

The 4 deaths which occurred among the 12 cases treated with thiazole derivatives were all in patients who developed acute bacterial endocarditis, a complication which apparently resists all forms of treatment. It is pointed out that if these cases are disregarded, the small series represents 8 consecutive cases in which clearing of the blood stream took place after the invasion by staphylococci.

There was no evidence that the drugs had any effect upon local lesions, which were treated surgically whenever accessible.

Detailed clinical reports on the 12 cases treated with thiazole are included.

The authors conclude that the evidence is sufficient to warrant a careful clinical study of the effectiveness of sulfathiazole in staphylococcic septicemia.

JOHN S. LOCKWOOD, M.D.

Schneider, L.: The Local Use of Sulfanilamide Powder and Hydrogen Peroxide in Wound Infections. *Am. J. M. Sc.*, 1941, 201: 208.

Schneider presents 2 cases of wound infection due to a combination of the hemolytic staphylococcus aureus and hemolytic streptococcus which were effectively treated by the implantation of sulfanilamide powder and hydrogen peroxide. The first case was the sixth admission in two years of a chronic periostitis of the right femur. Over a period of ten weeks, various forms of treatment were not successful. Metastatic sinuses developed about the heel and ankle. In addition to the organisms previously

mentioned, the bacillus pyocyaneus was cultured from the thigh and ankle. Two grams of sulfanilamide suspended in 30 c.cm. of hydrogen peroxide were introduced into the sinuses and the wounds were covered with many gauze dressings. In twenty-four hours the discharge was less and the granulations appeared healthy for the first time. After four successive days of treatment, only the bacillus pyocyaneus was cultured. When the same treatment was applied to the ankle wound, it also improved. Once a week powdered sulfanilamide was sprayed on the wound by means of a Shelanski insufflator. The wound gradually closed and after three and one-half months of sulfanilamide therapy (570 gr. locally), complete healing of the wound and of the osteoperiostitis had taken place. Cultures remained consistently negative for all organisms except the bacillus pyocyaneus until the wound had completely healed.

The second case was a deep, draining abscess of the right thigh with no demonstrable bone lesion. The abscess was opened and packed with 6 gm. of sulfanilamide powder and some hydrogen peroxide. The next day 4 gm. of sulfanilamide were used. In three days there was complete cessation of the discharge. Cultures revealed only the staphylococcus aureus, the hemolytic streptococcus having disappeared, but when repeated two days later no growth was obtained. Twelve days after operation the wound was healing by primary union. A total of 10 gm. of sulfanilamide were used.

The basis for the use of hydrogen peroxide with sulfanilamide locally is the oxidative-enzymatic theory of the mode of action of sulfanilamide. The hemolytic streptococcus, pneumococcus, gonococcus, meningococcus, and bacillus coli all produce hydrogen peroxide. Sulfanilamide has an anti-catalase activity which prevents the destruction of hydrogen peroxide produced by the organisms, and allows a high enough concentration of the peroxide to be reached to be toxic to the organisms. Staphylococcic lesions, usually being of a reducing nature, do not allow for the oxidation of sulfanilamide to products that exhibit anti-enzymatic activity. It was believed that the addition of hydrogen peroxide helped to overcome the reducing properties present in the wounds.

Schneider warns about the high blood sulfanilamide levels produced by this mode of administration, and states that all the toxic manifestations produced by oral administration must be watched for. In the first case the patient developed a transient alopecia, and a papulovesicular eruption of the palms and soles which was one month in disappearing after cessation of the drug. EDWIN J. PULASKI, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Holmes, G. W.: The Development of the Science of Roentgen Technique. *Am. J. Roentgenol.*, 1941, 45: 161.

America's foremost radiologist here reviews some of the achievements which have led to the development of this specialty. One of the early observations which Elihu Thomson made in 1896 was based on experiments on himself which demonstrated the injurious effect of the roentgen rays. Thomson consequently warned users of roentgen equipment of the dangers of this type of light. Unfortunately, the failure to appreciate fully these observations led to much suffering which might have been avoided.

The introduction of the mechanical rectifier by Snook was a revolutionary change and made available an amount of energy which far exceeded the capacity of the early roentgen tube. It was not until Coolidge developed the hot-cathode tube that the power thus made available could be used to the fullest extent. Further development of the hot-cathode tube by Coolidge and the perfection of the rotating anode tube first described by Rollins and others several years ago make possible the production of films which demonstrate in sharp detail the fine structures of moving objects.

The most important development in the field of roentgen films was the introduction by the Eastman Company of double-coated films which increased the contrast in the negative and permitted the use of the double-intensifying screen. The use of the intensifying screen had been first recommended by Pupin in 1896.

The introduction by Bucky of Germany of a grid which, when placed between the film and the patient eliminated much scattered radiation, led to better detail and contrast in films, but the perfection of a movable grid by Hollis Potter in 1916 led to its greater use.

Many important technical procedures have resulted from a more thorough knowledge of physics, anatomy, and pathology. Holmes cites as examples of this type of contribution the positions for examination of the maxillary sinuses, mastoid processes, and petrous tips developed by Caldwell, Waters, Granger, and Law.

The importance of stereoscopic roentgenograms was recognized before 1900 and Caldwell described apparatus for the production of a stereoscopic image on the fluoroscopic screen in 1901. The author believes that stereoscopic film examination should not be used to supplant views taken in anteroposterior and lateral planes. He calls attention to the fact that lateral films of the shoulder, spine, hip joint, and chest are of great importance.

Holmes reviews in some detail the work of Francis Williams who developed an unusually satisfactory fluoroscopic technique and made a number of observations between the years 1895 and 1901 which are still of value. Among these are the importance of fluoroscopy in the detection of motion of movable organs, its convenience as a means of preliminary examination to determine the most advantageous points of view for taking roentgenograms, and its value in the determination of the excursion of the diaphragm in the localization of early tuberculous lesions. Williams was probably the first to describe the roentgen appearance of the so-called "beriberi heart."

The use of contrast substances in roentgen examination was initiated by Becher of Berlin who, in 1896, injected lead subacetate into the gastro-intestinal tract of guinea pigs which had just been killed. In the same year Cannon began studies of the gastro-intestinal tract of living animals, using capsules of bismuth subnitrate. Two years later he and Williams studied the gastro-intestinal tract of children, using bismuth subnitrate mixed with food. Although the injection of air as a contrast medium was tried before 1900 its full importance was not realized until Dandy used it in a study of the cerebral ventricles and the subarachnoid spaces of the brain and cord. The development of iodized oils by Forestier and Sicard constituted another outstanding advance and permitted the study of the bronchial tree. Other contrast substances which, when taken into the body, are excreted by special organs have added new information and the author believes that this field is incompletely explored.

Holmes believes that it is the duty of the older roentgenologists to interest outstanding young men in the field in order that a healthy growth of the science of radiology be maintained. He believes that the older radiologists should make certain that roentgenography is accorded the place in universities, hospitals, and in the medical world which it deserves. He outlines some of the roads along which progress may be made. HAROLD C. OCHSNER, M.D.

Pendergrass, E. P., and Young, B. R.: The Roentgen Diagnosis of Neoplasms of the Air and Food Passages, with Particular Reference to the Larynx. *Radiology*, 1941, 36: 197.

This article constitutes an excellent review of the anatomy and physiology of the air and food passages.

Neoplasms of the tongue do not usually require roentgenographic examination for their discovery. The symptoms of such lesions are briefly outlined. Neoplasms in the oral pharynx produce blurring of the pharyngeal air shadow and thickening of the posterior pharyngeal structures which, if the growth is malignant and of short duration, is likely to be more marked on one side than on the other. Growths in the laryngeal pharynx, if unilateral, cause the outline of the pyriform recess to be indefinite. This

structure may become quite shallow or even obliterated. Such lesions are often seen best in posteroanterior roentgenograms.

Carcinoma of the larynx may produce enlargement or change in contour of the soft tissues of the extrinsic larynx. If the tumor arises in the ventricular bands it encroaches upon the ventricles. Failure of visualization of the laryngeal ventricles in the lateral view indicates some abnormality unless excessive ossification in the thyroid cartilage is the causative factor. Small benign tumors of the vocal cords such as papillomas and fibromas are visualized in both lateral and sagittal roentgenograms. Carcinoma involving the vocal cords which extends into the subglottic region is best demonstrated by a body-section roentgenogram. HAROLD C. OCHSNER, M.D.

Isola, A.: Recent Progress in Arteriography. Seriography and Photoradiography (Nuovi progressi nella arteriografia. La seriografia e la fotoradiografia). *Radiol. med.*, 1941, 28: 28.

In a good arteriogram it is necessary to show not only the main trunk and the chief branches of the artery but also the finest and most distal ramifications. This cannot be done with the usual roentgen film 30 by 40 cm., for with this film only a limited segment of the artery can be shown. The author has devised a seriograph by means of which it is possible to get a more prolonged view of the course of the opaque fluid through the artery. He takes 4 poses 15 by 40 cm. at varying intervals of time. By varying the intervals properly he has even been able to obtain images of both arteries and veins with a single injection of opaque substance. Two diagrams of the apparatus and arteriograms of 3 cases are shown. However, even this apparatus does not make the whole of the artery visible, for the length of the seriogram is only 40 cm. while the limb is longer than that. (Fig. 1).

He has also tried to apply fluoroscopy to arteriography. In this way, using two fluorescent screens placed end-to-end on which the limb is laid and a series of roentgenograms made, he has obtained a complete picture of the course of the contrast substance through the artery. However, in spite of some technical devices of which he made use, the results were not entirely satisfactory because the images were not very clear. There was a great deal of granulation and consequently a lack of detail. He thinks this method cannot be used in arteriography until it is perfected further.

AUDREY G. MORGAN, M.D.

RADIUM

Mayneord, W. V., and Honeyburne, J.: A Physical Study of Intracavitary Radium Therapy. *Am. J. Roentgenol.*, 1941, 45: 235.

In dealing with the physical dosage of intracavitary radium expressed in roentgen units, the authors warn against oversimplification such as, for example, the statement that "the dose to the cervix was so many roentgens." It was found that a change of position of only 0.1 cm. of a radium needle or tube may result in a difference of 100 per cent in the dosage at a particular point. Furthermore, it must be realized that points only a few millimeters apart may vary in dose very considerably. Therefore, the

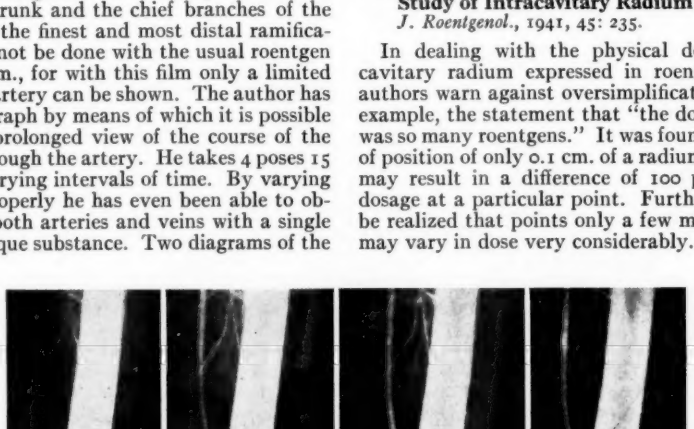

Fig. 1.

doses calculated close to radium containers represent gross approximations at the best. In practice, greater benefit is derived from the use of graphical methods of interpretation from isodose curves and the establishment of individual diagrams showing the complete distribution as well as the magnitude of the dose in roentgens at certain selected points. The description of the radium source and the statement of the time of treatment, in milligram hours or destroyed millicuries, must also accompany such a specification of the dosage.

In previous work isodose curves were determined by the authors for point sources of radium filtered with uniform spherical shells. However, since in clinical application, radium is always used in the form of tubes or needles, allowance must be made for the increased filtration at large angles to the normal as rays pass through filters at glancing emergence.

In the present article, this type of source is investigated by three methods: (1) the protractor, (2) the integral table, and (3) the dose contour method. The first and third are employed for the first time and therefore described in greater detail. In particular, a study of type of dose contours around linear sources is made and complete distributions are calculated around a representative series of radium applicators.

By this procedure, it is possible to construct a standard set of distribution diagrams not only in one but several planes, a fact which is of great clinical importance. After consultations with Hurdon of the Marie Curie Hospital, the authors constructed such standard diagrams for the technique of radium application used successfully at that institution for a number of years for the treatment of cancer of the cervix and of the body of the uterus. The most common arrangements for the carcinoma of the cervix were: (a) two 25 mgm. intra-uterine radium tubes in tandem with 2.5 cm. of active length; each with 1.0 mm. of platinum filtration, and three flat, intravaginal silver boxes (one against the cervix and one into each lateral fornix), each box containing 4 parallel 5 mgm. radium needles with 1.3 mm. of platinum equivalent filtration; and (b) one single 30 mgm. intra-uterine tube and one large intravaginal 60 mgm. box. For carcinoma of the body of the uterus, the arrangement (c) was the same as arrangement (a) for carcinoma of the cervix except that two additional 8 mgm. tubes were placed into the cornua, one of 1.1 cm. length on each side with a total filtration of 1.0 mm. of platinum, and only two intravaginal boxes were used, unless the cervix was also involved.

The distribution of radiation in space around one single tube was easily obtained by rotating the diagram about the axis of the tube. However, if the irradiation from several radium sources overlapped, the construction of spacial distribution diagrams became quite complicated. To simplify matters, the authors used the "three-dimensional dose-finder" which permits the dose received from each of a number of sources at a given point to be read simultaneously. This instrument is also described in detail in the text and illustrated. Likewise, a number of resulting diagrams in three mutually perpendicular planes are reproduced. From such planes it was easy to construct the isodose surfaces of particular interest. It was even possible to build isodose models by cutting out in cardboard the shapes, for example, of 100 roentgen hour contours, slotting them together in their perpendicular positions and filling up the framework so obtained with paraffin.

The establishment of complete volume distribution and isodose contour diagrams for intracavitary radium therapy permits comparison of various technical procedures leading to certain standard clinical arrangements of the radium sources.

T. LEUCUTIA, M.D.

Hurdon, E.: Radium Treatment of Cancer of the Uterus. *Am. J. Roentgenol.*, 1941, 45: 250.

This article, to a certain extent, is a continuation of the former. It gives clinical consideration to the volume distribution and the isodose contours of the radiations in relation to critical points in the pelvis when the radium sources are distributed according to the technique described by Mayneord and Honeyburne and used at the Marie Curie Hospital for the treatment of carcinoma of the cervix and corpus uteri. Up to 1932, intracavitary radium was employed without supplementary external irradiations, and this article deals only with that phase of the work.

Carcinoma of the cervix uteri. Generally speaking, the radium therapy of the carcinoma of the cervix uteri is based on the principles of moderately intensive interrupted dosage with a wide distribution of the radium sources, so as to obtain the most effective dose possible in distant tumor areas. If, for example, arrangement (a) as described in the former article, is used, the total dosage is given in sixty-six hours, divided into three treatments of twenty-two hours each, given at intervals of one and two weeks. The total radium application varies from 6,000 to 8,000 roentgens on the tissues of the cancer region. The following doses reach the various critical regions:

Lateral pelvic regions

A. 2 cm. from the cervical canal at the level of the internal os. Total dosage 6,600 roentgens.

B. 4 cm. from the canal at the same level. Total dosage from 3,300 to 4,500[1] roentgens.

C. 5 cm. from the canal at the same level. Total dosage from 2,300 to 3,800[1] roentgens.

D. At 1 cm. above the external os, 5 cm. from the canal. Total dosage from 2,640 to 5,000[1] roentgens.

Anterior and posterior regions

The total dosage at 1.5 cm. from the cervix anteriorly is 3,760 roentgens and posteriorly 3,300 roentgens. Careful packing insures this distance in most cases so that the bladder and rectum are well

[1]Lateral applicators packed well up and out.

protected, although it is advisable to keep both organs empty as much as possible while the radium is *in situ*.

The results at the end of five years are shown in Table I. The stages conform to the classification of the League of Nations Commission.

TABLE I.—CANCER OF THE CERVIX TREATED BY RADIUM THERAPY. RESULTS AT THE END OF FIVE YEARS.

Classification	Number Examined	Total Number Treated	Alive at End of 5 Years	Died of Cancer	Died of Intercurrent Disease	Survival Ratio at End of 5 years	
						Relative Per cent	Absolute Per cent
Stage I	36	36	31	4	1	88	88
Stage II	140	140	88	46	6	65	65
Stage III	408	408	131	272	5	32.2	32.2
Stage IV	141	117	10	106	1	8.5	7
Total	725	701	260*†	428**	13	37	35.8

*Only 3 cases had supplementary roentgen therapy.
**Only 10 cases had supplementary roentgen therapy.
†There was evidence of recurrence in 5 cases.

Carcinoma of the fundus uteri. The technique is based on the same principle as that for the treatment of carcinoma of the cervix uteri, except for the fact that the intra-uterine distribution of the radium, especially around the cornua, is increased. Arrangement (c) of the former article is a good example of this. The time and tissue spacing is likewise the same.

The following doses reach the various critical points:

A. At 0.6 to 0.8 cm. in the musculature of the fundus and the lateral walls of the corpus, and 1.5 cm. depth in the anterior and posterior walls. Total dosage 6,600 roentgens.

B. At 1 cm. depth in the musculature of the fundus. Total dosage 4,620 roentgens.

C. On the peritoneal surface of the fundus. Total dosage 2,640 roentgens.

D. On the peritoneal surface of the corpus. Dosage 4,620 roentgens.

The five-year survival ratios are shown in Table II.

TABLE II.—CANCER OF THE CORPUS TREATED BY RADIOTHERAPY. RESULTS AT THE END OF FIVE YEARS.

Stages of Growth	Number Treated	Alive at End of 5 Years	Percentage
Operable	7	7	100
Technically operable (surgery contraindicated)	33	18	54.5
Combined operable	40	25	62.5
Technically inoperable	27	4	14.8

Eighteen patients were treated by combined radium and roentgen rays: of 9 who were operable 6 are living; of 9 who were inoperable 2 are living; 1 was lost for follow-up.

All favorable cases (60 per cent) were treated surgically and with few exceptions only those unsuitable for surgery were referred for radiotherapy.

Since 1932, the employment of the complementary radium and roentgen rays or teleradium therapy has been made general for carcinoma of both the cervix and fundus uteri. The figures given do not refer to such situations. T. LEUCUTIA, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Nylund, C. E., and With, T. K.: On the Demonstration of Vitamin A Deficiency in Man. *Acta med. Scand.*, 1941, 106: 202.

Dietary surveys are of value in the demonstration of Vitamin A deficiency in man, but it is only in extreme cases that such deficiency can be proved by this method.

The determination of Vitamin A in the liver gives, without doubt, the best possible information concerning the Vitamin A standard of the organism. If the liver reserve is low, one must look for clinical symptoms of Vitamin A deficiency, but such symptoms are not necessarily to be found even if the reserves are entirely lacking. On the other hand, clinical symptoms of latent Vitamin A deficiency may possibly be found in spite of considerable liver reserves and, if this is the case, even a rather considerable reserve in the liver does not exclude the existence of slight symptoms of latent avitaminosis.

The Vitamin A and carotene contents of the blood serum are not reliable indicators of the Vitamin A reserve of the organism and are only to be regarded as expressions of the power of the organism to mobilize Vitamin A from its depots. Consequently, low values for Vitamin A serum do not always mean Vitamin A deficiency; however, high values speak strongly against Vitamin A deficiency, except in the case of chronic nephritis, in which disease high values of Vitamin A serum may be found in spite of low depots. The significance of the serum carotene in the demonstration of Vitamin A deficiency in health and disease is not yet sufficiently known.

Some authors have claimed that it is possible to demonstrate latent Vitamin A deficiency by microscopical examination of corneal or conjunctival smears (pre-exeresis), but the value of this method has not as yet been established.

Night blindness is the initial symptom of Vitamin A deficiency in all mammalian species which have been examined thus far, and this seems also to be the case in man. Hemeralopia is, however, by no means a special characteristic of Vitamin A deficiency, since it is a general symptom of several eye conditions. On the other hand, it is correct to exclude Vitamin A deficiency in an individual with normal dark adaptation, as all cases of Vitamin A deficiency examined thus far by reliable techniques have shown unquestionable hemeralopia. Hence, for the present, stress must be placed on the number of subjects showing normal dark adaptation rather than on the number showing hemeralopia, if the Vitamin A standard of a group of individuals is to be determined.

The principal points of the technique for the determination of Vitamin A in the liver and in the blood serum, as well as for the demonstration of hemeralopia, are discussed.

De Blasi, A.: Experiments on Traumatic Shock. Elevated Temperatures and Shock (Esperimenti sullo shock traumatico [Azione delle temperature elevate sullo stato di shock]). *Policlin.*, Rome, 1940, 47: sez. chir. 213.

In order to substantiate his clinical impression that the administration of heat to a patient in traumatic or postoperative shock does not always improve his condition but sometimes makes it worse, De Blasi produced traumatic shock experimentally in dogs and studied the influence of the external administration of heat. Under morphine narcosis (using 0.01 gm. per kgm. of body weight), shock was produced by 30 to 35 blows with an iron tube on the lower abdomen. Pulse, blood pressure, and temperature observations were made. Heat was applied after the induction of shock with warm moist compresses, care being taken to avoid burns. Shock, characterized by rapid pulse, low blood pressure, and low temperature, was fully developed in from twenty to thirty minutes after its induction and, within thirty to sixty minutes after the induction, gradually diminished spontaneously, with restoration to normal in about three hours. In 2 of a group of 8 animals in whom heat was applied after shock had been established, no deviation was found from the normal course established in a group of 4 dogs in whom heat was not used. Of the remaining 6 dogs treated with heat 2 died following the use of heat, and 4 showed marked impairment of the blood pressure, although they finally recovered.

In order to explain his results the author mentions the previous findings of Rein, according to whom shock, which is temporarily compensated for by vasospasm in regions outside of the area of the shock-precipitating vasodilatation and by sudden blood removal from certain reservoirs (spleen, liver, and vena cava), may become fatal when an additional burden, as muscular work, leads to a disturbance of the delicate compensation mechanism. Thus, he believes, cutaneous vasodilatation, obviously produced by the external application of heat, disturbs this mechanism and brings about a turn for the worse in experimental shock in animals. He warns against any avoidable interference with the regulation mechanism in clinical shock, i.e., the induction of muscle labor or digestion, and interference with thermoregulation. HEINRICH LAMM, M.D.

Agostinelli, E.: Infestation with Round-Worms in Connection with Surgery (Contributo alla conoscenza dell 'ascaridiasi chirurgica). *Policlin.*, Rome, 1940, 47: sez. prat. 1169.

The author reports a clinical case of ascaris infection, reviews the literature, and points out the prac-

tical importance to the surgeon of a knowledge of the surgical significance of this condition.

A three-year-old child was treated surgically for a congenital hernia and hydrocele on the right side. Under ether anesthesia a herniotomy was done according to the Bassini technique. On the third postoperative day the child had a chill and developed a fever which was associated with symptoms of delirium. On reopening the surgical wound no evidence of infection could be determined. An anthelmintic was administered and the child passed some large, long round-worms. After this the temperature dropped to normal and the child recovered. The author states that the ether anesthesia probably excited the worms to increased activity with resulting liberation of their peculiar toxin, which in children may induce fever, signs of meningeal irritation, and even convulsions.

The author has reviewed the literature and notes that ascaris infestation may cause occlusion and perforation of the intestine, perforation of the abdominal wall, peritonitis, appendicitis, volvulus, and diseases of the liver and pancreas, and even of the lung. Examples of such complications are cited in detail from the literature. As a result of such experiences the author suggests the advisability of examining the feces for ascaris ova before any contemplated surgery. In such cases anthelmintic treatment before surgery may eliminate serious difficulty in the postoperative course. JACOB E. KLEIN, M.D.

Wile, U. J., and Holman, H. H.: A Survey of 68 Cases of Extragenital Chancres. *Am. J. Syph., Gonor. & Ven. Dis.*, 1941, 25: 58.

In 841 cases of primary syphilis, 68 or 8.0 per cent presented extragenital chancres.

Chancre of the lip was by far the most frequent, as it occurred in 39 or 57.3 per cent of the total number of cases. One patient in this group was a male in the cancer age who presented himself for treatment of a cancer of the lip, and who already had had radium therapy.

Chancre of the tonsil was presented by 10 patients, 9 of whom revealed other evidence of syphilis. Several had been treated for streptococcic infection.

Digital chancre was present in 6 patients—3 of them physicians and 1 a nurse—the conditions having all been acquired during the care of patients with syphilis.

Two patients had chancre of the breast and 1 woman of forty-three years had even been operated upon for carcinoma of the breast as she had presented such a typical picture of ulcerative lesion of the breast with involvement of the axillary nodes.

There was a chancre of the pharynx in 2 cases, on the tongue in 5 cases, and on the palm, forehead, chin, and anus in 1 case each, which accounts for the remainder of the cases.

The failure of early diagnosis in these cases of extragenital chancre is emphasized. The presence of syphilis should always be considered in the face of any lesion in association with a regional lymphatic enlargement which does not respond to ordinary therapeutic measures. ANDREW MCNALLY, M.D.

Haldbo, H.: Tests of Vegetative Function after Post-Traumatic Dystrophy of the Extremities (Vegetative Funktionspruefungen bei Posttraumatischer Extremitaetendystrophie). *Nord. Med.*, 1940, p. 1124.

The vegetative nervous system, which consists of the sympathetic and the parasympathetic nerves, has among other functions vasomotor and sweat-secreting functions. Both lend themselves well to practical clinical research, which has often been resorted to in the presence of peripheral and central lesions as well as traumatic and post-traumatic disturbances. Various procedures are used. Leriche has made use of the oscillometer in vasomotor disturbances. Ipsen has taken comparative skin temperature values in segmental areas of symmetrical extremities, especially in vasoconstriction after injury. Verification is made with the cold test. The extremity is held in water at 15 degrees for ten minutes, then the skin temperature is measured. When vasoconstriction is present the temperature remains low abnormally long; but the opposite holds true in inflammation in which condition the temperature increases much faster on the affected side than on the well side. In the case of fractures Ipsen found an initial predisposition to vasoconstriction followed by hyperemia.

The chief procedure (according to Christiansen, Fog, and Vangaard) is the immediate induction of cold: and at the same time the addition of heat. The examined segment of the extremity is submerged at once in a cold box filled with a mixture of ice and water. The control extremity is placed in a vessel of water from 42 to 44 degrees. After the highest temperature of the skin is recorded a gradual cooling is produced, after which the bath is interrupted. The temperature is taken as distally as possible on the extremity, that is, proximal to the nail and the terminal articulation, since here the reaction of the smallest vessels is more sensitive than further above; however, it was observed that the changes except those resulting from the smallest, mildest, subluxation and bruising are not exactly localized at the point of injury, but quickly extend cephalad and in the severe cases the entire extremity becomes involved. The curves for the same measurements, made by means of a firmly placed thermoelectric couple, are recorded. The changes of the skin temperature depend solely on the variations of the blood circulation, i.e., on the changes of the diameters of the smallest vessels. For the determination of the sweat secretion the author used the method of Minor (1927). One hour before the test is to begin 1 gm. of aspirin is administered, and the skin area to be studied is painted with iodine solution (iodine 1.5, oleum ricin 10, alcohol, absolute, a.d. 100), then powdered with starch, after which a blue color appears. Then the patient is caused to perspire (steam bath, foot or hand bath, or hot tea).

The perspiration colors the painted skin bluish black. The contrast between the bluish black and the yellowish white area which is free from sweating is very striking and can be recorded photographically. The sweating so produced was centrally conditioned and depended on the intact nerve structure, so that a clear picture of possible injury within the vegetative nervous system was obtained. Pilocarpin, which is uncertain in its effects, acts more peripherally on the sweat secretion, similar to neurotomy but not like nerve degeneration. The centrally-conditioned sweating is independent of the circulation of the blood, i.e., the blood-pressure cuff placed on one side produces no changes on the other side. The sweat secretion is governed by the heat-regulatory mechanism. The sweating is usually simultaneous with hyperemia of the skin vessels. Perspiration in health appears simultaneously in symmetrical areas. Herein rests the applicability of the tests, which definitely show great individual variations: not all extremity segments perspire equally profusely; the palms of the hands and the plantar surfaces of the feet perspire only a little; the back of the hand and foot, and the finger, the forearm, and the leg, especially on the extensor surfaces, perspire profusely; the little finger and the thenar eminence perspire only moderately.

The author presents a series of results from research in dystrophy, subluxations, and single inflammations, 50 cases in all. All disturbances of the vegetative nervous system found thereby were not only vasomotor but comprised also the sweating function. In all of the cases of impending dystrophy there were vasoconstricting tendencies and places with diminished secretion. This condition is also found after injury or inflammation. In a single case, in the course of a mild subluxation vasoconstriction and increased secretion were observed throughout the entire period. Usually after a short time (a few weeks or months), the effects of the injury disappear, except in cases of demineralization, edema, or changes in the skin. In that case, the non-sweating area extends over the entire extremity. Otherwise, one can see a period of hypersecretion when impending disturbances are brought under control, even when one cannot prove the presence of vasoconstriction. These two conditions are in no way related. One may see vasoconstriction with diminished secretion as well as vasodilatation with increased secretion. Each condition suggests one imperfect function of the two functions of the vegetative nervous system; there may be others.

Great prominence should be given to the use of sweating experiments in the surgical clinic. They are procedures with which to trace the spread of disturbances after injuries and make it possible to intervene with suitable means such as novocaine injection. The advantage of these experiments rests upon the fact that they can be used anywhere by anyone and also that they do not cause any discomfort to the patient.

(Richter). H. H. Groskloss, M.D.

Janisch-Rašković, V.: Environment in Relation to Cancer Disposition and Cancer Age (Einfluss der Umwelt auf Krebsdisposition und Krebsalter). *Ztschr. f. Krebsforsch.*, 1939, 49: 598.

On the basis of a series of 2,049 cases of genital cancer in women, the author makes a study of the influence of environment on the incidence and age of cancer development.

The series included 1,868 cervical carcinomas, 64 carcinomas of the corpus uteri, 37 ovarian carcinomas, 26 vulvar carcinomas, 19 vaginal carcinomas, 18 uterine sarcomas, 14 ovarian sarcomas, 1 tubal carcinoma, and 2 vulvar sarcomas. The so-called better classes were represented by 7.56 per cent of the cervical, 34.4 per cent of the corpus uteri, 13.5 per cent of ovarian, 10.5 per cent of the vaginal, and 11.5 per cent of the vulvar carcinomas, and by 38.8 per cent of the uterine, and 14.3 per cent of the ovarian sarcomas. Among 176 cases among the better classes, there were 76.7 per cent of cervical, 12.5 per cent of corpus uteri, 2.8 per cent of ovarian, 1.2 per cent of vaginal, and 1.7 per cent of vulvar carcinomas, and 4 per cent of uterine and 1.1 per cent of ovarian sarcomas. Of 1,873 cases of carcinoma among the poorer class group, 92.8 per cent were cervical, 2.84 per cent corpus uteri, 1.71 per cent ovarian, 0.91 per cent vaginal, 1.22 per cent vulvar, and 0.05 per cent tubal carcinomas, and 0.53 per cent uterine, 0.64 per cent ovarian, and 0.1 per cent vulvar sarcomas.

There were also many variations in the incidence of the different types of cancer in various groups of the population. In 1,525 cancer patients of the Southern Slavonic group south of the Danube and Save rivers, (formerly Serbia, Montenegro and Bosnia) (herein called the A_1 group) there was 93 per cent of cervical, 1.77 per cent of corpus uteri, 1.77 per cent of ovarian, 0.95 per cent of vaginal, 0.92 per cent of vulvar, and 0.06 per cent of tubal carcinomas, and 0.72 per cent of uterine, 0.72 per cent of ovarian, and 0.06 per cent of vulvar sarcomas. Among 332 cancer patients of similar descent from north of the Danube and Save rivers (formerly Hungary) (the A_2 group), the corresponding figures were 86.1 per cent cervical, 6.62 per cent corpus uteri, 1.8 per cent ovarian, 0.9 per cent vaginal, and 2.4 per cent vulvar carcinomas, and 1.2 per cent uterine, 0.6 per cent ovarian, and 0.3 per cent vulvar sarcomas. In 90 German cancer patients, (Group B), there were 83.3 per cent cervical, 8.9 per cent corpus uteri, 1.1 per cent ovarian, and 3.3 per cent vulvar carcinomas, and 2.2 per cent uterine, and 1.1 per cent ovarian sarcomas. Among 56 Hungarian patients, (Group C), there were 95.4 per cent cervical, and 1.8 per cent ovarian and vulvar carcinomas. In the 54 cases of Group D, made up of several nationalities, i.e., Roumanians, Greeks, Russians, Jews, cervical carcinoma comprised 76.1 per cent, cancer of the corpus uteri, 15.2 per cent, ovarian carcinoma and uterine sarcoma 4.2 per cent, and vaginal cancer, 2.2 per cent. Cancer of the body of the uterus appeared especially frequently in Russian patients: of 14

uterine carcinomas, 4 were of the corpus, and in the 7 cases of uterine carcinoma in the Jews, 2 were of the corpus. The better classes were represented in A_1 by 6.62 per cent, in A_2 by 12.4 per cent, in B by 15.5 per cent, in C by 3.6 per cent, and in D by 39.1 per cent. The incidence of cervical cancer in the better classes was 87.1 per cent, and in the poorer classes 93.6 per cent; the incidence of cancer of the body of the uterus, in the two classes was 5.9 and 2.84 per cent, respectively. In Group A_2 cervical cancer made up 73.2 per cent of the cases in the better classes and 87.9 per cent in the poorer classes; cancer of the corpus uteri 14.6 and 5.5 per cent, respectively. In Group B cervical cancer made up 50 and 89.4 per cent of the cases in the better classes and cancer of the body of the uterus 21.4 and 6.6 per cent, respectively. In Group C there was no cancer of the body of the uterus, while in Group D the figures for cervical cancer were 44.4 and 96.4 per cent and for cancer of the body of the uterus 38.8 and 0 per cent. Figures on the other types of cancer are also included in the tables.

In another section of the article the cancer patients are divided into 3 groups based on locality. Among 384 from Belgrade (I), with 21.1 per cent from the better classes, there were 88.5 per cent cervical, 4.68 per cent corpus uteri, 3.9 per cent ovarian, 1.04 per cent vaginal, and 0.26 per cent vulvar and tubal cancers, and 0.52 per cent uterine and 0.78 per cent ovarian sarcomas. Among 395 patients from the provincial towns (II) with 18.7 per cent from the better classes there were 84.3 per cent cervical, 6.07 per cent corpus uteri, 1.26 per cent ovarian and vaginal, and 3.54 per cent vulvar cancers, and 2.28 per cent uterine, 1.01 per cent ovarian, and 0.2 per cent vulvar sarcomas. Among 1,196 patients from the rural districts (III), with 1.6 per cent from the better classes, there were 94.1 per cent cervical, 1.78 per cent corpus uteri, 1.34 per cent ovarian, 0.78 per cent vaginal, and 0.86 per cent vulvar cancers, and 0.55 per cent uterine and ovarian, and 0.08 per cent vulvar sarcomas.

The difference between the poorer and better classes in the classification according to locality is indicated in all groups as follows: cervical cancer in the better classes, Group I, 81.5 per cent, Group II, 67.6 per cent, and Group III, 90.4 per cent; in the poorer classes, Group I, 90.4 per cent, Group II, 88.2 per cent, and Group III, 94.2 per cent; cancer of the corpus uteri, in the better classes, Group I, 11.1 per cent, Group II, 16.2 per cent, and Group III, 4.8 per cent; for the poorer classes Group I, 2.9 per cent, Group II, 3.7 per cent, and Group III, 1.78 per cent.

Two extensive tables classify the material from the various localities into social classes and derivation.

This review proves the following facts:

In the so-called better classes the incidence of cancer of the corpus uteri without respect to locality or derivation of the population is from three to four times as great as in the other groups. In the groups A_2, B, and D we find a constant higher incidence of cancer of the corpus uteri than in Group A_1. The relative frequency of corpus cancer is less in the rural group than in Groups I and II.

Further tables follow in which the author attempts to demonstrate the assumed absolute frequency of female genital cancer during the years from 1920 to 1935 in various sections of Jugoslavia, and to detect sources of possible error. He arrives at the conclusion that the influence of environment on cancer disposition cannot be denied, that conditions favorable for one type of cancer are unfavorable for another type (as for instance in the case of cancer of the cervix and cancer of the corpus uteri), and that a certain mode of life cannot cause cancer but can only increase or diminish the disposition to cancer.

The age of predilection for cervical cancer was between 36 and 50 years (63.9 per cent of the cases); the average age was 43.5 years, 47.8 years for the better classes and 43.15 years for the poorer classes; for Group A_1 43.2 years, Group A_2 44.8, Group B 46.1, Group C 42.2, and Group D 43.06 years; for Group I 41.18 years, Group II 46.45 and Group III 43.67 years. The age of predilection for cancer of the corpus uteri was between 46 and 60 years (65.6 per cent of the cases); the average age was 55.15 years, 56.6 years for the better classes and 53.5 years for the others; for Group A_1 52.8 years, Group A_2 54.5 and Group B 56 years, and for Group I 53.2 years, Group II 57, and Group III 53.1 years. The age of predilection for ovarian cancer was between 41 and 50 years in 38.8 per cent of the cases; the average age was 45.6 years. Forty-two per cent of the vaginal cancers occurred between the ages of 26 and 35 years, the youngest at 19 years, and the average age was 38.8 years. The age of predilection for vulvar cancer was between 56 and 70 years in 46.1 per cent of the cases, the average age being 58 years; for uterine sarcoma the age of predilection was between 46 and 55 years in 61.1 per cent of the cases and the average age was 51.4 years. The age of predilection for ovarian sarcoma varied from 16 to 25 years in 50 per cent of the cases and from 36 to 40 years in 21.4 per cent, the average age being 32.9 years.

The age of predilection and average age for all types of cancer in all groups of social classes and nationalities and localities are given. However, the material is very small so that no conclusions are permissible. If one assumes that the younger age periods for cancer of the cervix and cancer of the corpus uteri for the poorer classes is related to premature aging of these classes, it might be possible to explain the younger age period for inhabitants of the capital and rural districts as compared with that of town populations on the same basis. The endurance of the women in the towns is not put to so great a test as that of the women of big cities and in the country who often attend both to their household duties and to business or to work in the fields which leads to exhaustion and premature aging.

(Vilma Janisch-Rašković). Edith Schanche Moore.

Webb-Johnson, Sir A.: Pride and Prejudice in the Treatment of Cancer. *Brit. M. J.*, 1941, 1: 1, 39.

In the prevention of cancer much can be done by treating local and general conditions known to be precursors of cancer, and possibly also by excluding extraneous influences which may be remote causes. Once cancer has developed, however, the growth continues in spite of the withdrawal of any remote, non-essential cause. In our present state of knowledge only the local manifestation of the disease can be treated. Surgical excision often has the limitations of disfigurement, mutilation, and permanent disability. Radiotherapy attempts to check an otherwise irreversible process.

Early diagnosis is still the master key to success. This requires an opportunity to examine the patient and the application of skill and improved methods of clinical examination. Morbid histology is essential not only to diagnosis, but, with the grading of tumors, to prognosis, and possibly also to deciding upon the best line of treatment.

Cancer of the skin is essentially a local disease, since over 90 per cent of 800 cases of skin cancer observed had no glandular metastases when first seen. It should be remembered that skin cancer is often an outward sign of an inherent tendency to carcinoma elsewhere. Although radiation will cure a large proportion of skin cancers, surgical excision is the treatment of choice for a small primary lesion when disfigurement will not result. Recurrences of rodent ulcer after radiotherapy are more resistant to radium treatment than recurrences after surgical excision. Surgery should be resorted to immediately if the response to radiation is disappointing. Often in the excision and repair of large defects the surgeon is handicapped by impaired healing due to radiation. The treatment of nevocarcinoma has been disappointing. Many of these tumors are radiosensitive and radiation should be tried in all cases, but surgical excision with removal of the lymphatic drainage area offers the best chance. Prophylactic surgical excision of moles subject to irritation is advisable.

In cancer of the lip radiation yields a five-year cure in 65 per cent of all cases and in 90 per cent of Stage I cases. This is as good as or better than surgery, and healing is often obtained without loss of substance. Surgical excision should be employed if a considerable defect is inevitable and also when a case is not responding to radiation. Neck dissection is required only if the glands are palpable. In cancer of the oral cavity the results of radiotherapy are as good as those of surgical excision and are often secured without mutilation, which justifies the drift from surgery. With certain specified exceptions, the author believes that for cancer of the tongue, radiation of the primary lesion and operative removal of the lymphatic area only if the glands are or become palpable, gives the best prospect of cure. The best results of surgery and of radium in the treatment of intrinsic carcinoma of the larynx are about on a par. Extensive surgery entails mutilation and disability; this is minimized with radiation. Most statistics do not distinguish between different types of tumors of the pharynx or give the exact location and consequently evaluation of treatment is difficult. Tumors of the nasopharynx, the valleculæ, the pyriform fossa, the deep pharynx, and the base of the tongue often respond remarkably to radiotherapy.

Treatment of carcinoma of the esophagus by surgery has been disappointing, though there have been brilliant isolated successes. The tumor is of the same histological type as carcinoma of the cervix uteri, but in the former we are dealing with a thin-walled canal surrounded by vital structures. The tumor is very sensitive to radiation and its rapid destruction by direct radium treatment often leads to perforation. External methods of radiation are being tried more assiduously. There have been no lasting cures by radiation in proved cases. Turner advises that if the history is short and there is no evidence of metastases, and if improvement is rapid after gastrostomy, radical operation should be considered. The real hope for the future lies in finding some method by which radiation can be safely applied to this perilous region. The growth itself is vulnerable to attack, but a way must be found to protect the vital surrounding structures. Except as a preliminary to radical excision, gastrostomy is now seldom required, the method of intubation being the preferable palliative procedure.

Surgical treatment of carcinoma of the rectum may produce five-year cure in 83 per cent of the cases in Stage A and in between 40 and 50 per cent of all cases. While radiation therapy has produced brilliant results in a small proportion of operable cases, it is too uncertain to justify its use in operable cases. Unfortunately, the rectal mucous membrane is generally just as radiosensitive as the tumor.

A comparison of the best five-year and ten-year survival rates of radiation therapy and surgery in carcinoma of the cervix uteri shows that radiation produces the better results. The radical operation for carcinoma of the cervix is one of great difficulty and few operators can attain the best results. Radiation treatment, on the other hand, can be duplicated with an adequate staff and equipment in many centers. Cases not responding to radiotherapy should be submitted to operation without delay.

In cancer of the breast results are excellent in Stage I cases, but if the axillary glands are involved over 60 per cent of the patients do not survive five years. Because of the extensive area to be dealt with external radiation has advantage over radium implantation. When considering reports of favorable results from external radiation alone, it should be remembered that as a rule the diagnosis is not confirmed by pathological study. There is no doubt that successful results can be obtained, but the radiation should probably be supplementary to the surgery. Pre-operative radiation demonstrates which cases are radiosensitive, and these are just the ones in which radical surgery is likely to fail. The radia-

tion also decreases the vitality of the cancer cells previous to the operative disturbance. It may interfere with healing, but this danger is minimized by resort to operation as soon as the pre-operative course is completed. In regard to postoperative treatment, the tissues will not tolerate the full dose of radiation because of the surgical trauma and impaired blood supply, and nothing less than the full dose is likely to be adequate. Some figures indicate that combined pre-operative and postoperative therapy may be best. There is no question that radiotherapy does good in some advanced cases and also in the case of some metastases, but in others it adds to the patient's sufferings. Radiotherapy should never be used as a placebo or in obviously hopeless cases.

Because of the need for expensive equipment, which is quickly out of date, and the complicated methods of treatment, cancer centers will become increasingly necessary. JOHN L. LINDQUIST, M.D.

Barrett, M. K.: The Influence of Genetic Constitution upon the Induction of Resistance to Transplantable Mouse Tumors. *J. Nat. Cancer Inst.*, 1940, 1: 387.

The induction of resistance to transplantable tumors in mice by a prior inoculation of homologous normal living cells was an early contribution to the study of cancer. Bashford, Murray, and Cramer reported the use of defibrinated blood to induce resistance by this method.

The mechanism involved has been the subject of extensive investigations, but no generally accepted explanation has been evolved. Murphy has suggested that the phenomenon may be due to a type of sensitization and has adduced some evidence in support of such a conception. Whether this represents a cellular immunity in the ordinary sense remains an open question, but it should be kept in mind that the "sensitization" here is directed against certain attributes of intact cells which depend upon their viability and integrity, and is not just a matter of specific proteins or other cell constituents. This interpretation presupposes a degree of genetic difference between the cells injected and the host as a basis for the reaction.

Now that strains of mice are available which are relatively, if not entirely, homogeneous, it is possible to test the effect of genetic differences upon this phenomenon and to make some inferences with regard to the influence of genetic homogeneity. It is important to do so because there is little chance of applying the principles involved to the control of the naturally occurring disease if the mechanism proves to be a sensitization phenomenon.

The work presented by the author was undertaken in order to observe some effects of genetic differences upon the phenomenon under discussion. This was done by comparing the growth of grafts of three transplantable mammary carcinomas in mice of three strains. Test mice of each strain were immunized with blood of their own strain, or with that of the other strains, and the results compared with each other, and with those obtained with control animals.

With the two pure-line tumors used, no significant resistance could be induced in an inbred mouse against a tumor derived from the same strain.

The author's findings favor the belief that the mechanism involved is a sensitization type of phenomenon and depends upon the foreignness of the tissues used.

The evidence obtained by the author's experiments together with that of previous workers gives force to the most important implication of this work, which is that the search for a means of treating human cancer based upon these principles, e.g., by autoplastic grafting or with sensitizing injections, is likely to prove a fruitless one.

JOSEPH K. NARAT, M.D.

Overgaard, K., and Okkels, H.: The Action of Dry Heat on Wood's Sarcoma. *Acta radiol.*, 1940, 21: 577.

Tissue-culture techniques have indicated that certain tumors are less resistant to heat than normal tissues. Westermark, moreover, demonstrated that thermic action on an inoculated tumor has a selective destructive influence.

The authors' experiments were performed on mice inoculated on the tail with Wood's sarcoma and treated by the application of heat locally to the tumor. Diathermy, short-wave diathermy, and ultra short-wave diathermy were used which varied the temperature from 42 to 46° C. and the time from five to sixty minutes. The results indicated that a moderate application of heat has a specific tumor-destroying effect in doses harmless to normal tissues. This effect depends solely on the temperature-time combination used and is independent of the frequency of the current. Heat combined with roentgen therapy produced a beneficial effect when the doses of both components were limited to sub-therapeutic levels. The authors stress the point that the dosage of treatment used lies well within the limits of that which may be employed for human therapy.

Histological investigation reveals the effect of heat to be vascular congestion together with shrinkage of the neoplastic cells, which eventually become transformed into a granular mass and disappear. The nuclear changes do not begin before from twenty to thirty minutes and are complete after one or two days. The surrounding tissues show essentially no change. STANLEY ROBBINS, M.D.

DUCTLESS GLANDS

Iandolo, C.: Hypophyseal Syndromes of Traumatic Origin (Sulle sindromi ipofisarie di origine traumatica). *Policlin.*, Rome, 1940, 47: sez. med 341.

The author reviews a number of hypophyseal syndromes brought about by trauma among the ones described in the literature and gives histories of 3 cases of his own. His own cases were as follows:

1. A man of fifty-three at the age of twenty-nine had been struck a violent blow in the left temporoparietal region. Four months later he began to note marked polydipsia and polyuria and increasing weakness and anorexia. In 1937 a roseolous eruption developed on his thighs and abdomen, consisting of many hemorrhagic petechiæ. On admission to the hospital in January, 1939, he was in a condition of extreme cachexia; he died February 8. Autopsy showed a hematic cyst in the anterior lobe of the hypophysis.

2. A man of thirty-three in May, 1938, while riding a bicycle fell violently to the ground striking on the right supra-orbital region. In December of that year he began to notice intense thirst and later intense polyuria. He was treated with extract of the posterior lobe of the hypophysis and improved greatly.

3. A woman of forty-five in January, 1927, was struck by a tramcar and dragged for some distance. Among other injuries there was a large lacerated and contused wound in the left parieto-occipital region. A condition doubtless due to injury of the hypophysis developed, consisting of adiposity, hypertrichosis of the masculine type, polyglobulia and hyperglycemic polyuria, increased basal metabolism, signs of intracranial hypertension, and moderate chronic meningitis and visual disturbances, the latter symptoms doubtless caused by slight hemorrhages.

The cases described in the literature show all types of hypophyseal syndromes, both of decreased and increased function. Cases of hypophyseal syndrome due to trauma are not nearly so rare as they were formerly believed to be, though they are still rare in comparison with the total number of brain injuries. They generally develop gradually and the history of trauma is frequently overlooked. They are sometimes incorrectly diagnosed as traumatic neuroses. They are caused most frequently by gunshot injuries of the head, fractures of the base of the skull, or lesions incurred during operation in the sellar region. The trauma generally causes hemorrhage of the hypophysis. Because of its copious blood supply the hypophysis bleeds easily and because of its softness it is easily crushed against the bones. The possibility of such injuries of the hypophysis in trauma should be borne in mind and a search made for them if any suspicious symptoms develop. AUDREY G. MORGAN, M.D.

Antognetti, L., and Patrono, V.: The Influence of Implantation of the Pituitary Gland on the Urinary Elimination of a Substance Producing Hyperglycemia (Influenza dell'impianto di ipofisi sulla eliminazione urinaria di una sostanza ad azione iperglicemizzante). *Policlin.*, Rome, 1940, 47: sez. prat. 1075.

The authors had found and reported previously that a substance producing hyperglycemia is excreted in the urine of normal individuals, and that in cases of eosinophil adenoma of the pituitary gland its amount in the urine is decreased.

In order to study the influence of pituitary implantations on elimination, the authors aseptically removed the pituitary glands of young calves immediately after the killing and grafted them into the anterior rectus sheath of human subjects. While the influence of such transplantations on the hormonal balance is only temporary, as these are heterografts, it is doubtlessly present. The human subjects thus studied were children with pituitary physical and genital underdevelopment. The authors found that pituitary implantation makes the excretion of the hypoglycemia-producing substance in the urine in hypopituitary subjects more like the type found in normal persons: in subjects with an abnormally low output of this substance, it increased after transplantation, while it decreased in those with an abnormally high excretion. In a case of hypopituitary disturbance of growth, diabetes insipidus and diabetes mellitus, transplantation of the calf hypophysis resulted in a reduction of diuresis, the restoration of renal concentration ability to normalcy, but an increase of relative and absolute glycosuria.

The authors interpret their findings as a support of their theory that there is a pituitary influence on production, utilization, and elimination in the urine of the hyperglycemia-producing substance.

HEINRICH LAMM, M.D.

Belasco, I. J., and Murlin, J. R.: The Effect of Thyroxin and Thyrotropic Hormone on the Basal Metabolism and Thyroid Tissue Respiration of Rats at Various Ages. *Endocrinology*, 1941, 28: 145.

Thyrotoxicosis was induced in rats by the subcutaneous injection of thyroxin. The thyrotropic principle of the anterior pituitary lobe was injected subcutaneously into other rats. Body weight loss and increase in the metabolic rate varied with the age of the animals. The body weight loss and hypermetabolism of young rats during the administration of either thyroxin or thyrotropic hormone were less than those produced in older animals. In spite of weight loss the weight of the thyroid gland increased with administration of the thyrotropic hormone. Normal thyroid tissue respiration showed a rapid decline after a rat was four months old. In the older rats thyroxin decreased and thyrotropic hormone increased the amount of oxygen consumption by the gland.

These results indicate that the administration of thyroxin will depress thyroid respiration, even though it elevates the general metabolic rate. The authors suggest that the thyroid gland of individuals who take thyroxin over a long period of time may be unable to return to an active state after cessation of the medication. These individuals may be compelled to continue thyroid medication in larger amounts.

The clinical implication is that patients who need thyroid treatment might benefit only temporarily from intermittent injections of thyrotropic hormone along with the ingestion of desiccated thyroid gland.

By intermittent injection of this hormone the thyroid gland would be maintained in a relatively normal condition and would be able to resume its normal function more promptly.

EDWARD W. GIBBS, M.D

Richter, C. P., and Schmidt, E. C. H., Jr.: Increased Fat and Decreased Carbohydrate Appetite of Pancreatectomized Rats. *Endocrinology*, 1941, 28: 179.

The authors report another study on the self-selection of food. Fifteen rats were pancreatectomized and offered a standard McCollum diet for a period of time and then were offered a self-selection of diet in which they had access to eleven purified substances in separate containers. Before being given the self-selection diet, the animals showed diabetic signs, i.e., polydipsia, increased appetite, hyperglycemia, and weight loss.

While on the self-selection diet, most of the animals manifested a marked appetite for fat, ate little or no sucrose, and had an increased appetite for yeast. The average intake of carbohydrate was 19 per cent, of fat 56 per cent, and of proteins 25 per cent.

When again placed on the McCollum diet, most of the animals showed polydipsia and hyperglycemia, increased their food intake, and reduced their gain in weight.

The authors concluded, therefore, that the rats by their dietary selections worked to correct the diabetic symptoms. RULON W. RAWSON, M.D.

Patrono, V.: A Qualitative and Quantitative Study of Urinary Estrogens in Man (Studio qualitativo e quantitativo degli estrogeni urinari dell' uomo). *Riforma med.*, 1940, 56: 1095.

Patrono made his study on 8 apparently healthy and endocrinologically well balanced men whose ages varied from nineteen to thirty-four years, and he used the method of Smith, Smith, and Schiller to obtain the urinary extracts which he subjected to the Allen-Doisy test. He discusses his results and states that this kind of study carries the investigator into the field of physiological and pathological ambisexuality of man and woman, which rests on the solid foundations of the pluriglandular theory of sexes. The characteristic which, from the sexual point of view, clearly differentiates woman from man is her specialized function of maternity. In connection with the essential endocrine substratum (corpus luteum) of this particular sexual orientation, the urine of woman contains a non-ketonic substance possessing estrogenous activity, i.e., estriol, which the author's investigations have shown to be absent from the urine of man. Otherwise, and perhaps because of the common origin from the ovosperm, one sex takes part in the other, assuming in the ontogenesis a more apparent than real autonomous aspect which is based on differences that are more of quantitative than of qualitative nature. In fact, at present two groups of substances are known which are chemically interrelated: the masculinizing ones, called androgens, and the feminizing ones, called estrogens, which both are present in man and in woman. The best known androgenous substances of the urine of man are androsterone and dihydro-iso-androsterone; both are also found in the urine of woman. The best known estrogenous substances of the urine of woman are (apart from estriol) estrone and estradiol; the author's investigations have shown that both are also found in the urine of man. However, his study has revealed that, while the androgenous activity of the urine of woman compared to that of the urine of man presents a ratio of 1:1.75, the estrogenous activity of the urine of man compared to that of the urine of woman shows a ratio of 1:3.73. In other words, woman has more male in her than man has female, and this agrees with the clinical concept of Marañon to the effect that woman is more intersexual than man.

From the point of view of the semiological value of the qualitative and quantitative determination of estrogenous substances in the urine of man, the present investigation calls attention to the particular value which could be assumed by the study of the relation of estrone to estradiol (11 confirmed) for the estimation of the degree of intersexuality in man: this relation seems normally to be already higher in man than in woman, provided that the woman is not considered during the days which precede the appearance of menstruation; at this time, the relation between estrone and estradiol is practically the same as in man, perhaps because in this period of the menstrual cycle the normal woman, who is not pregnant but fertile, reaches the highest degree of her physiological intersexuality. RICHARD KEMEL, M.D.

Frazier, C. N., and Hu, C.K.: Increased Resistance to Syphilis in the Rabbit Following Prolonged Administration of Urinary Estrogens. I. Feminizing Effects of Estrogens on Adult Male Rabbits. II. Character of the Reaction to Treponema Pallidum in Feminized Male Rabbits. *Endocrinology*, 1941, 28: 283, 294.

This paper is concerned with a study bearing on the relationship between sex and immunity to syphilis. The origin of the problem lies primarily in a group of clinical observations which show that syphilis in many respects is a much milder disease in women than in men, and that pregnancy apparently plays an important rôle in activating, or in enhancing, the defensive reaction against this disease.

That pregnancy apparently enhances natural resistance to syphilis further emphasizes the importance of the sexual factor to the defensive reaction. We have assumed for the reasons stated that some endocrine function peculiar to the female and intimately related to gestation plays a dominant rôle in the defensive mechanism. One of the striking phenomena of pregnancy is the elaboration of large quantities of estrogens. With the possibility in mind that estrogenic hormones might have im-

portant functions in the development of the body's resistance to syphilis, either directly or indirectly, these experiments were undertaken. Adult male rabbits subjected to the action of urinary estrogens were infected with treponema pallidum. In the first of two experiments, the early physiological effects of the estrogenic preparation were found to coincide with a modification of the severity of the disease. These results led us to the opinion that the influence of estrogens on infection was indirect and probably related to the tissue changes which they induced, especially those in the testes. Upon this assumption a second experiment was performed in which inoculation was deferred until there was evidence of the full physiological effects of estrogens. These included well defined signs of feminization as exhibited by changes in the sexual organs, and by the development of secondary sexual characteristics.

Mammary glands. The first manifest effects of treatment were related to the nipples and the mammary glands. Enlargement of the former began almost at once, and by the sixteenth day of treatment had progressed to the size found in pseudopregnancy. At this stage a clear secretion could be expressed from the nipples of many animals. By the eightieth day of treatment the nipples were approximately as large as those of a lactating female rabbit.

External genitalia. A decrease in the size of both testes was appreciable as early as thirty days after treatment was commenced, but in most animals this change was not apparent before eighty days of treatment. After fifty days of treatment the glans penis softened, and the urinary meatus began a process of elongation. Preceding these changes the prepuce appeared red and edematous for several days. Shortening of the glans progressed together with ventral cleavage until the corpus cavernosum urethræ had receded into the depths of the prepuce. After one hundred and fourteen days of treatment the urethra could be everted and the mucosal surface rolled easily onto the outside of the shaft of the penis. By the time one hundred and fifty days of treatment had elapsed the glans had disappeared with the exception of two lateral tags which were the remnants of the cavernous bodies. Later, these also disappeared.

Psychosexual behavior. The feminized males were more docile and passive than normal rabbits. When placed with does they acted with indifference toward them and in no case attempted copulation. They fled from normal males that attempted copulation, and occasionally uttered sharp cries when attacked. In one case copulatory actions of a normal male were terminated by ejaculation, but no spermatozoa could be found in the vestibulum-like structure of the feminized male.

DISCUSSION

In general the changes induced following injections of estrogens on adult male rabbits were progressively in the direction of feminization. The response of different tissues and organs in a succession of orderly changes may be interpreted as indicating a variation in the threshold of susceptibility, which was dependent, perhaps, upon the degree to which pituitary function was stimulated or depressed by the estrogens.

The prominent anatomical alterations observed among the estrinized animals were related for the most part to the genital organs and to the mammary structures. The external genitalia were reduced to a form resembling that of the female rabbit. The involution of the scrotum and partial ascent of the testes returned the animal to a sexually neutral condition approaching that of early life.

The changes in the mammary structures were equivalent to those induced in normal female rabbits by pseudopregnancy. There was enlargement of the nipples, and growth of the primary ducts and rudimentary glands. Stimulation of a secretion grossly indistinguishable from milk occurred especially in the animals of the first experiment. Similar nipple and mammary growth has been produced in some species by the action of estrone and estriol. However, only in the guinea pig, of the species extensively studied, has estrone been observed to cause complete growth of the mammary glands.

Although the development of the mammary glands is dependent primarily upon the action of estrogen, the initiation and maintenance of lactation has been shown to be a function of the anterior pituitary lobe. The appearance of milk in many of the male rabbits of these experiments demonstrated that the estrogens, or some other substance present in the urinary extract, influenced secretion, either directly or by stimulating the release of the lactation-producing factor of the anterior pituitary lobe. However, the prolonged administration of estrogenic substance exerted the opposite effect, as the secretion ceased or became irregular during the latter part of the period of treatment. Besides, in the second experiment the extract failed to induce the same quality of secretion as it had in the first.

Although there was considerable individual variation in the rate and degree of response to the estrogens, the difference between the animals of the two experiments with respect to lactation was too great to be due to chance alone. Whether or not aging of the extract was a factor influencing this difference would require investigation. This possibility is suggested because of the time elapsing between the two experiments, approximately fourteen months. On the other hand, the absence of any other important difference in the response to treatment in the two experiments points against this being a factor. The age and breed and general care of the rabbits in both cases were essentially the same. There remains, however, the possibility that the difference in the size of the dose of estrogen was sufficient to account for the variation in the character and amount of secretion in the two experiments. It has been suggested that small quantities of estrogen affect the anterior pituitary lobe in such a way as to promote the

secretion of the lactation factor. In this connection it has been shown that the administration of large doses of estrogen results in a decrease or total disappearance of mammary secretion in the rabbit.

The mode of action of the estrogens on the gonads and accessory sex organs is attributed to their depressant effect on the anterior pituitary lobe, which results in the inhibition of the secretion of the gonad-stimulating principle.

In the second experiment the course of syphilitic infection in two groups of adult male rabbits, homogeneous as to breed, age, and nutrition, was studied. Before intratesticular inoculation with treponema pallidum, one group of animals was subjected to prolonged treatment with an estrogenic substance prepared by extracting human pregnancy urine with butyl alcohol. The animals were injected daily with the ether-soluble fraction of this extract dissolved in olive oil. The estrogenic content of the preparation was assayed by means of the vaginal growth effect on ovariectomized albino rats. The physiological effects of the estrogenic substance were manifest in the growth of the nipples and the mammary glands together with the stimulation of lactation; the feminization of the external genitalia and atrophy of the testes; the development of a dewlap, a secondary sexual characteristic of the female rabbit; and in certain changes pertaining to psychosexual behavior.

Among the rabbits treated with estrogens, the early manifestations of syphilis were much milder and followed a shorter course than among the sexually intact rabbits. The former showed an increasing ability to withstand the injurious effects of the disease the longer they were treated. This was shown by the greater frequency with which they failed to develop generalized foci of infection.

The resistance to disease developed by the testis was the most noteworthy modification of the reaction to infection, although the skeletal and cutaneous tissues behaved in a similar manner. The period of latency was greatly prolonged among the treated animals, and they remained in a better state of nutrition.

The possibility that testicular changes induced by estrogenic action are directly related to the inhibition of infection is discussed.

JOHN A. LOEF, M.D.